A LEARNING 'LEARNING' MODEL FOR OPTIMISED CONSTRUCTION WORKFORCE DEVELOPMENT

by

Gloria Unoma Ene

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ABSTRACT

Integrating learning and work has become important for several reasons. The recognition that the key resources for wealth creation, knowledge and ideas are embedded in human capital. Furthermore, fast-paced advances in knowledge, technology, and access to information ensure that capabilities rapidly become obsolete. Continuous learning and workplace learning have therefore become essential. These developments have highlighted the pivotal role of learning in individual career development and organisational performance and the construction industry needs to address these issues. The construction industry, however, continues to report skill gaps suggesting that construction businesses need to consider creative ways to deliver skill-enhancing opportunities for their workforce. The challenge is global but has added significance for African emerging economies considering their developmental needs.

Integrating workforce learning and development key practices into construction business was therefore the crux of this research which was aimed at developing a conceptual learning model that will enable construction firms to optimise performance in line with their business goals. Given the complexity of the construction domain and the need to allow integration of diverse processes, perceptions, experiences, practices and interactions, a pragmatic philosophical lens was employed allowing for a mixed methods research approach. A social constructionist ontology and a largely interpretivist stance was adopted. Surveys and case studies were conducted employing questionnaires, interviews and focus group discussions for data collection. Data analysis methods used were relative importance, correlational and constant comparative analyses.

The research investigated the two main elements of learning systems, the learner and the learning environment. The learner aspect found that emotional and social attributes were significantly associated with the performance of intermediate construction skills while key workforce practices emerged from the learning environment studies. These findings were integrated to develop the construction learning and development optimising model (CLEARDO). The research was limited to Nigeria because of its current focal position in the African economy.

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DEDICATION

This thesis is dedicated to the memories of:

My inspiring father, Isaac Anekwe Ene

My beloved sister, Amaka “Ugochinyelu MFR” who always believed in me more than I believed in myself

My cool brother-in-law, Duke

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LIST OF ABBREVIATIONS

Abbreviation	Definition
AEC	Architecture Engineering and Construction
AfDB	African Development Bank
ANOVA	Analysis of Variance
AUC	African Union Commission
CBT	Competency Based Training
CIOB	Chartered Institute of Building
CITP	Construction Industry Transformation Plan
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integrated
CPD	Continuous Professional Development
Gc	Crystallised Intelligence
ECA	Economic Commission for Africa
EI	Emotional Intelligence
Gf	Fluid Intelligence
FOCI	Federation of Construction Industry
GDP	Gross Domestic Product
GMA	General Mental Ability
HCD	Human Capacity Development
HDI	Human Development Index
HR	Human Resources
HRD	Human Resource Development
HRM	Human Resource Management
IEI	Innovation Enterprise Institute

LIST OF ABBREVIATIONS (cont'd)

Abbreviation	Definition
ILO	International Labour Organisation
NABTEB	National Business and Technical Examination Board
NBTE	National Board for Technical Education
NECA	National Employment Consultative Association
NEPAD	New Partnership for Africa's Development
NIIMP	Nigeria's National Integrated Infrastructure Initiative Master Plan
NZCER	New Zealand Council for Educational Research
OD	Organisational Development
OECD	Organisation for Economic Co-operation and Development
P-CMM	Peoples Capability Maturity Model
PIDA	Programme for Infrastructure Development in Africa
QMS	Quality Management System
RII	Relative importance Index
SEI	Software Engineering Institute
UK	United Kingdom
USA	United States of America
UNDP	United Nations Development Programme
UNSD	United Nations Statistics Division
VEI	Vocational Enterprise Institution
VET	Vocational Education and Training
WEF	World Economic Forum
WfD	Workforce Development
WLD	Workforce Learning and Development

CHAPTER 1 INTRODUCTION

1.1 Introduction

The Architecture, Engineering and Construction (AEC) industry is critical to society, the economy and the environment (World Economic Forum, 2016). The quality of life, for virtually the entire world population, is heavily influenced by the built environment surrounding people (Ofori, 2012; Rwelamila, 2012). According to the World Economic Forum (WEF) (2016), construction currently contributes 6% of global Gross Domestic Product (GDP), 5% of GDP in developed countries and more than 8% of GDP in developing countries. Nevertheless, the construction industry is considered the largest consumer of resources and raw materials, it generates high proportions of solid waste (40% in the USA), accounts for 25-40% of total global energy use, and consequently is responsible for equivalent proportions of carbon emissions. Construction has been described as a 'horizontal' industry which (like the financial services industry) serves all other industry verticals (WEF, 2016) given that productive activity in all industries almost always occurs within or by means of constructed assets (Ive and Gruneberg, 2000; Hillebrandt, 2000). In the same vein, Osabutey *et al.* (2012) note that the performance of the construction industry is essentially linked to national development and prosperity.

Productivity improvement in the AEC industry over the past 50 years has been described as negligible relative to other industries and though new technologies, materials and processes have emerged, the rate of innovation has been very slow and uptake by construction industry practitioners has not been widespread (Chartered Institute of Building, 2007; van Egmond, 2012; WEF, 2016). The industry needs to transform, and investment in human capacity is key to any transformation process (Nafukho, 2013). The

New Zealand Council for Educational Research (NZCER) (2014) notes that human capital is now being acknowledged as being more important than physical capital for wealth creation, and there has been growing recognition of this fundament since the turn of the century (Trilling and Hood, 2001). World Bank (2000) reported that global wealth is concentrated less and less in factories, land, tools, and machinery whereas the knowledge, skills, and resourcefulness of people are increasingly critical to the world economy. Consequently, learning has become a crucial parameter for economic growth and global competitiveness (Illeris, 2007) and human resource development (HRD) plays an integral part in the survival and sustainability of organisations (Chan and Marchnigton, 2012).

Construction plays a vital role in the economic and social development of most countries. For example, the construction sector provides the physical infrastructure and backbone required for economic activity. The African Economic Outlook 2016 categorises the African economy as the second fastest growing economy in the world (after emerging Asia) and identified private consumption and construction investment as the main drivers of growth (African Development Bank, Organisation for Economic Co-operation and Development, and United Nations Development Programme, 2016). Global economic recovery and growth in the medium term is expected to be driven entirely by emerging market and developing economies and is predicated on the normalisation of growth in countries such as Russia, Nigeria, South Africa, Brazil and in parts of Latin America and the Middle East (International Monetary Fund, 2016). Construction is one of the main drivers of such economic growth. Table 1.1 shows the contribution of construction to GDP growth of the two largest economies and two fastest growing economies in Africa as well as three advanced economies.

Table 1.1 Construction industry contributions to National GDP by countries, 2015

GDP	Cote d'Ivoire	Nigeria	South Africa	Tanzania	Germany	UK	USA
Annual growth/ %	8.5[1]	2.7	1.3	7.0	1.7	2.9	2.4[1]
Construction contribution/ %	1.81[1]	3.65	3.62	13.62	4.22	5.67	3.83[1]

Source: United Nations Statistics Division (2016)

[1] Latest results available are for 2014

The construction industry is also a large-scale provider of employment as shown in Table 1.2. These construction industry potentials have been exploited by governments to create jobs during economic slowdowns, reducing unemployment while stimulating the economy at the same time

Table 1.2 Percentage of workforce engaged in construction by countries, 2015

Workforce	Cote d'Ivoire	Nigeria	South Africa	*Tanzania*	Germany	UK	USA
Construction workforce/ %	1.59[1]	7.11[1]	8.93	2.07	6.77	7.17	6.68

Source: International Labour Organisation (ILO) (2016)

[1] Latest results available are for 2012

Despite advances in technology, construction remains largely labour intensive (Dainty *et al.*, 2007). To succeed in an increasingly knowledge based society construction firms must retain adequate numbers of formally educated and appropriately trained skilled workers (Muya *et al.*, 2006). In advanced economies, the highly skilled personnel account for 15-20%; the intermediate skills sector, 60-70%; the low skilled sector, less than 10%; with unskilled workers making up between 10 – 15% of all employees (Rauner, 2007). David and Lopez (2001) had, however, argued that the advanced economies vary

in their area of focus in terms of skills for human capital formation. For instance, the US specialises in high skills development through formal education, Germany specialises in intermediate skills development through vocational education while the UK attempts to develop both high skills and intermediate skills.

Horwitz (2013) notes that although there is no consensus on the categories of work that constitute intermediate skills and high skills, in general, artisans and technicians are considered intermediate skilled workers, while graduate engineers are considered high skilled workers. However, international labour market demands at various times have necessitated the categorisation of artisans and technicians as highly skilled workers. Horwitz (2013) also reports that current global demand for intermediate skills exceeds supply and that this is inimical to economic growth (Horwitz, 2013).

Shortages in construction skills provision have been experienced in many countries over the past two decades and to varying degrees. Typical examples include USA, UK, Germany and Sri Lanka as studies from the mid-1990s indicate. Haas, *et al*., (2001) recorded that the USA was facing long term labour shortages at the time. Agapiou *et al*. (1995), Mackenzie *et al.* (2000), Dainty *et al.* (2005) and Chan and Dainty (2007) each reported on the skills shortage crisis in the UK. Syben (1998) discussed a similar situation in Germany and Jayawardane and Gunawardena (1998) in Sri Lanka. The primary concern appears to be with the quality of skills available (Dainty *et al*., 2005). Despite various initiatives by construction industry stakeholders including their governments in the past years, construction craft skills shortage is still a topical issue in many countries.

For instance, in the UK, the Chartered Institute of Building (CIOB) third skill survey in 2009 found that despite the recession and downturn in construction demand, the industry still faced skill shortages on a wide scale (Chartered Institute of Building, 2009). Furthermore, Abdel-Wahab (2012) reports that despite all industry and government initiatives to address the problem, the construction industry in the UK continues to experience skills shortages. Wang, *et al.* (2010) chronicle the skills shortage crises in the USA for over two decades and the efforts made by industry and governments to train to meet demands. Davids and Esau (2012) discuss similar situations in South Africa. The difficulty in finding adequately skilled employees continues to be a concern for employers in the German construction sector (European Commission, 2016).

Construction skill shortages and mismatches are not limited to advanced economies but are also evident in the emerging economies and developing countries of Sub-Saharan Africa (Ene *et al.*, 2016). Studies have reported construction skills shortages and mismatches in Egypt (Yassa, 2014), South Africa (Othman, 2014; Rwelamila, 2007; Hall and Sanderlands, 2009), Zambia (Muya *et al.*, 2006), Tanzania (Debra and Ofori, 2005; Kikwasi, 2011), Nigeria (Awe, 2009; Awe, *et al*., 2011; Medugu, *et al*., 2011; Bilau, *et al*., 2016) and Ghana (Darko and Löwe, 2016). However, Muya *et al.* (2006) note that investing in HRD is a prerequisite to the construction industry achieving competitiveness and efficiency in the delivery of the infrastructure necessary to facilitate both national and regional development in sub-Saharan Africa. The current unemployment and particularly the youth unemployment figures prevailing in most economies (see Table 1.3) suggest that there is potential opportunity for attracting, developing and retaining the required human capital by the construction industry in order to optimise performance.

Table 1.3 Total unemployment and youth unemployment by countries, 2017

Workforce	Cote d'Ivoire	Nigeria	South Africa	Tanzania	Germany	UK	USA
Total Unemployment	9.4	6.6	25.7	3.3	4.7	5.5	4.7
Youth Unemployment/ 15 – 24 years	13.5	9.9	48.8	6.4	8.1	14.6	12.0

Source: ILO (2016)

According to an ILO (2010) report, the future prosperity of any country depends on the number of persons in employment and how productive they are at work. The report also highlighted the various studies that link education, skills, productivity and economic growth and presents the findings which suggest that a 1% increase in training days leads to 3% increase in productivity, also that 16% of overall productivity growth is attributable to training. Developing a competent workforce with the requisite knowledge, skills and process abilities is therefore critical to the transformation of the AEC industry. Although this is generally understood by industry practitioners, strategic workforce planning and/or development is rarely a focus of attention for construction organisations (Debrah and Ofori, 2006; Kululanga, 2012; Osabutey *et al.*, 2012; WEF, 2016).

The reasons given for the paucity of sustained workforce development (WfD) initiatives are centred on construction business being project-based and highly cyclical (Oyegoke, 2009; WEF, 2016). The construction workforce is therefore considered unstable and any investments in terms of cost and time for training may not have provided commensurate returns by the time workers move to other projects (WEF, 2016). This aligns with Dainty *et al.* (2007) who attribute construction firms' reluctance to train workers to fear that

the relationship will not last long enough to realise investment in training. Wang *et al.* (2008) attribute construction firm reluctance to train to the cost and time required to train workers and the lack of new workers interested in being trained. In addition to the cost of training, Wang *et al.* (2010) also include the fear of training workers who may go to work for competitors. Awe *et al.* (2010) consider cost to the firms, time taken for the learning activity; and the wasted effort in training workers who are likely to move to other firms. This reluctance to train may have contributed to the skill shortages experienced in the construction industries of many economies (Awe *et al.,* 2010; Dainty *et al.*, 2007; Wang *et al.*, 2008; Wang *et al*., 2010).

The unique characteristics of the construction industry may present difficulties for transformation, but are well worth the effort considering that small improvements in performance will impact positively on society, the economy and the environment (WEF, 2016). Cumulative volume of global construction from 2016 to 2030 is forecast at US$ 212 trillion (Global Construction Perspectives and Oxford Economics, 2015) and a mere 1% reduction (for instance) in construction costs would save society US$ 2.1 trillion or an annual average savings of US$140 billion. This potential for high impact has instigated some transformation agenda for the construction industry. For instance, governments in partnership with their construction industries have come up with transformation plans focused on improving industry performance: UK Construction 2025 (HM Government, 2013) and Malaysia's Construction Industry Transformation Plan (CITP) 2016-2020 (CIDB, 2015). A common threat to these plans is the skills shortages at professional and vocational levels and weak training systems (CIDB, 2015; HM Government, 2013).

The WEF commenced a comprehensive project aimed at guiding and supporting the global Engineering and Construction Industry in its transformation process. Although its first report on the project (WEF, 2016) does not set specific targets, it presents a framework for transformation which specifically recognises the need for capacitated people and the challenge the industry faces with an increasing shortage of talented, knowledgeable, highly skilled and innovative workers (vocational, professional and managerial). The report also asserts that construction organisations need to spearhead the capacitation of their workforce through planning and implementing strategic initiatives for WfD (WEF, 2016).

Oyegoke, *et al.* (2009) suggest that long term construction workforce retention and continuous training through strategic planning is important for all construction organisations. Oyegoke *et al.* (2009) demonstrated how a small construction firm has combined government training initiatives with firm specific workforce practices, driven by the firm's needs, to successfully attract into, develop and retain talent in its workforce leading to improvements in firm turnover and profits. The suggestion is that strategic workforce planning and development should even out the effects of cyclical construction activity on availability of a competent construction workforce. WEF (2016) also emphasises the need for strategic workforce planning and development spearheaded by construction firms in order to improve the productivity of the construction industry.

Furthermore WEF (2017) has highlighted the changing nature of work and learning driven by globalisation and advances in technology. These have shortened the 'shelf life' of workers' skill sets and emphasises the need for improving the efficiency of adult

learning, life-long learning, and work place learning concludes that governments and businesses should consider 'creative' ways to deliver skill-enhancing opportunities for their workforce (Davey et al., 2004; WEF, 2017).

This research investigates the delivery of effective and dynamic workforce learning and development (WLD) opportunities in the construction workplace driven by the organisation's strategic business needs. Construction businesses in Nigeria provide the specific cases studied in this research. Nigeria is an emerging economy and developing country in Africa, whose potential for economic growth and large population is suggested to have significant impact on the global economy (International Monetary Fund, 2016)

1.2 Background to the Study

This section introduces the trends that currently impact on the volume and complexity of construction activity in Africa and the implications for human capital development. Aggregate contribution of construction to the African continent's GDP was 5.8% in 2014 indicating a steady increase in construction activity from the financial crises years (United Nations Statistics Division, 2016). The African Union Commission (AUC) (2013) reported that the economic growth experienced did not create sufficient jobs, particularly for women and youths. High youth unemployment levels recorded even during periods of growth in economic activity may represent a shortage of required skills or skill mismatches in the economy (African Development Bank, Organisation for Economic Co-operation and Development, United Nations Development Programme, Economic Commission for Africa, 2013; AUC, 2013; United Nations Development Programme, 2015; ILO, 2013). Either way, sustainable strategies for human capital

development are critically needed for the success of Africa's development programmes (Nafukho, 2013).

United Nations Development Programme (UNDP)'s Human Development Index (HDI) is a composite index that focuses on three basic dimensions of human development: the ability to live a long and healthy life; the ability to acquire knowledge; and the ability to achieve a decent standard of living. Human development by enhancing health, knowledge, skills and awareness increases human capital and broadens opportunities and choices (UNDP, 2015). Although progress has been made in recent years, Sub-Saharan Africa remains the lowest region on the UNDP's HDI with an aggregated HDI of 0.518 relative to a world average of 0.711 (UNDP, 2015). This gives some idea of the 'pool' from which construction organisations draw their workforce needs.

Various reports have identified a critical shortage of skills required for infrastructure development in Africa (AUC, 2013; UNDP, 2015). WEF (2015) report on Africa's strategic infrastructure initiative identified a shortage of technical, engineering, project management, financial and legal skills required to plan and implement infrastructure projects, yet demand for these skills are rapidly increasing. The expected boost in construction activity over the next decade is likely to exacerbate the problem unless human capacity development (HCD) programmes are made a priority by the African AEC industry.

Given these challenges, the African AEC sector is uniquely placed as the central fulcrum through which pivotal drivers of transformation can be leveraged over short, medium and long term horizons. However, these need to be contextualised into the wider remit

which by default involves a myriad of push-pull forces not least of which are physical infrastructure, investment, strategy, learning, education, training and development. These issues are fundamental. For instance, the African Development Bank (AfDB) (2012) noted that the physical infrastructure deficit in most of Africa has been widely acknowledged and discussed. However, Africa is emerging as a destination of choice for many investors and development actors as they look for high-growth markets despite the lingering effects of the 2008 financial crisis and recession (Deloitte Team, 2013). Opportunities for investment in the African construction industry have grown significantly and the main drivers are: high population growth; urbanisation, growth of cities and housing; sustainability and environmental pressures; strong growth and resultant shortage of business space; rising middle class and increased consumer spending power; and regional integration and cross-border infrastructure projects (AfDB, AUC, and New Partnership for Africa's Development, 2010; AfDB, 2011; Deloitte Team, 2013; KPMG Team, 2014).

AfDB, AUC, and New Partnership for Africa's Development (NEPAD), (2010) project the average annual economic growth rate for African countries at 6% from 2010 to 2040 and this will be driven by a surging population, increasing levels of education and technology absorption. Africa's population hit the 1 billion mark in 2010 and is projected to grow to 2.5 billion by 2050 (United Nations, 2016). In the last two decades, Africa has experienced high rates of urbanisation at 3.5% annually and this trend is expected to hold up until 2050. In 2010, 35% of Africa's population lived in urban areas and the projections for 2030 and 2050 are 50% and 60% respectively (Deloitte Team, 2013). Rising urbanisation has put immense pressure on existing infrastructure and housing and has increased the growth of slums (AfDB, 2012). To cope with rising urbanisation,

governments are upgrading settlements through integrated infrastructure and services and developing new cities. Though African countries have traditionally not had a mortgage market, this is changing as banks and specialised institutions are introducing new mortgage programmes (AfDB, 2012; Deloitte Team, 2013; KPMG Team, 2014).

The development of infrastructure in Africa has long been recognised as one of the top political and economic priorities for the growth and competitiveness of the continent. The Programme for Infrastructure Development in Africa (PIDA) jointly developed by the AUC, NEPAD and AfDB (WEF, 2015) was designed to support the integration of transport, energy, information communication technology (ICT) and trans-boundary water networks, boost trade, spark growth and create jobs. When implemented it is expected to not only transform the way Africa does its business but also to deliver a well-connected Africa with transnational infrastructure as the physical backbone for regional integration: opening up regional markets; linking production clusters in different countries; facilitating free movement of goods, services and people; and fostering physical stability and peace (AfDB, AUC, and NEPAD, 2010). The expected investment in a variety of large infrastructure in Africa of an estimated US$ 100 billion annually for the next 10 years makes Africa the most popular prospect for close to 50% of the global leaders in the construction and engineering industry (Deloitte Team, 2013; KPMG Team, 2014).

The forecasted increase in construction in Africa has brought to the fore the challenge of the shortage of the knowledge, skills, capacities and talents, both technical and professional, required to drive the expansive and complex infrastructure and housing projects envisaged in Africa sectors (AfDB, AUC and NEPAD, 2010; AfDB, 2011; AUC,

2013). The WEF overview of the Africa Strategic Initiative project agrees with these earlier reports and noted that Africa faces a critical shortage of the technical and managerial skills needed to structure and develop infrastructure projects (WEF, 2015). The WEF (2015) overview attributed the skill shortages to low enrolment in technical courses, emigration (brain drain), lack of access to education and increased demand for skilled labour across sectors.

The situation in Nigeria (the focus of this research) is typical of the African context. Nigeria is currently (2016) the largest economy in Africa (International Monetary Fund, 2016) and accounts for 22.5% (by dollar value) of all large infrastructure projects on the continent (Deloitte, 2016). This trend may continue with the implementation of Nigeria's National Integrated Infrastructure Initiative Master Plan (NIIMP) which is designed to bridge Nigeria's infrastructure deficit estimated at $3 trillion over a period of three decades. Furthermore, Global Construction Perspectives and Oxford Economics (2015) report forecasts that construction activity in Nigeria is expected to grow by 160% between 2015 and 2030.

This forecasted increase in construction activity is currently not underpinned by the requisite human or technological capabilities (AfDB, 2011; Nafukho, 2013; Osabutey, *et al*., 2012;). Nigeria's HDI was 0.514 in 2015, a figure that is below the regional average of 0.597 and further below the world average of 0.711. According to AfDB (2005), 60% of Nigeria's labour force was classified as unskilled and untrained. In the same vein, human capacity deficits in the Nigerian construction industry have been widely reported and the situation is seen to have reached crisis levels (Awe, *et al.,* 2009; Bilau, *et al.,* 2016).

Semi-skilled and unskilled persons are usually employed on construction sites resulting in low productivity, inefficiency in terms of cost and time, and poor quality of finished products (Awe *et al.,* 2009; Medugu *et al.,* 2011). Furthermore, Adewale, *et al.* (2014) found that the Nigeria construction industry depends mostly on an informal apprenticeship system. This aligns with Nwanoruo (2004) who posited that informal apprenticeship systems account for 80-90% of Nigeria's skilled workforce. The informal apprenticeship system prevalent in the Nigerian construction industry, is mostly unstructured, unregulated, unaccredited and uncertified (Awe *et al.*, 2009, Bilau, *et al*., 2016; Iro, *et al.,* 2013). Training is therefore "ad-hoc", provided as required by the job at hand and usually provided by more experienced workers present on site (Awe *et al.*, 2009, Bilau, *et al*., 2016; Iro, *et al.,* 2013). This is corroborated by Adewale *et al.* (2014) who found that 90% of workers on construction sites surveyed have never received formal training, over 99% of master craftsmen do not have certificates, and the training provided is not regulated.

According to ILO (2012), informal apprenticeship refers to a system where an apprentice acquires the skills for a trade or a craft by learning and working alongside a master craftsman. An agreement between the apprentice and the master craftsman is reached which is embedded in the social norms, customs and traditions of the society (Haan, 2006; ILO, 2012; John and Cyril, 2015). The informal apprenticeship scheme grew out of traditional apprenticeships which had their roots in socio-cultural traditions involving the transfer of skills to members of a family or clan (Haan, 2006). The essential features remain in that an apprentice observes and imitates the master craftsman who corrects and guides the trainee. The master craftsman may structure the training, but mostly the training is determined by the orders received by the enterprise. The apprentice learns a

technical skill and is also inducted into a business culture and network and the cost of training is shared between the apprentice and the master craftsman (Association for the Development of Education in Africa, 2015; ILO, 2012).

The ILO (2012), differentiates between informal and formal apprenticeships. The main differences are that, formal training is complemented by classroom instruction, the training agreement is regulated by formal laws, and the cost of training is shared between the apprentice, the master craftsman/employer and the government.

Formal skills education and training in Nigeria is currently provided by a wide variety of institutions and agencies. The National Board for Technical Education (NBTE) is the principal vehicle of the Federal Ministry of Education in Nigeria, specifically created to handle all aspects of technical and vocational education falling outside traditional university education (NBTE, 2014). At post-secondary school level, there are the Vocational Enterprise Institutions (VEIs) and Innovation Enterprise Institutions (IEIs) which are private institutions that offer vocational, technical, or professional education and training to meet the increasing demand for technical manpower by the various sectors of the nation's economy. The National Innovation Diploma is awarded at successful completion of the programme. Institutions are regulated and accredited by NBTE. Out of the 99 approved institutions at this level, only four offer construction skills related courses (NBTE, 2014)

Basic education in Nigeria spans nine years of schooling comprising six years of primary school and three years of junior secondary school. At post-basic education level, the technical colleges of education provide vocational subjects that are examined by the

National Business and Technical Examination Board (NABTEB). Certificates awarded by NABTEB are the National Technical Certificate (NTC), Advanced National Technical Certificate (ANTC), National Business Certificate (NBC), Advanced National Business Certificate (ANBC), and Modular Trade Certificate (MTC) (AfDB, 2005; National Business and Technical Examination Board, 2014). These qualifications replaced those previously awarded by the Royal Society of Arts London, City and Guilds of London and the West African Examination Council. Technical colleges are regulated and accredited by the NBTE.

AfDB (2005) reports a mismatch between formal skills training and labour market requirements and this they have attributed to outdated curricula, private sector participation not solicited in curriculum reviews, and the learning of narrow skills using old equipment in Nigerian schools. Along similar lines, Awe *et al.* (2009) highlighted that underfunding has led to the reduction (and in many areas) elimination of the practical content of the instruction received; by default, turning the technical colleges into "glorified" secondary schools. The focus of these technical schools also appears to have shifted from imparting industry needed skills to preparing students for university and polytechnic education (Federal Republic of Nigeria, 2004, NABTEB, 2014).

Outside of the purview of the NBTE are the craft schools which are funded and regulated by state governments. These schools operate at post primary education level and certificates are awarded by the State Ministries of Labour and Employment on payment of a required fee. The structure of training and methods of assessment and testing are not standardised. There is also a plethora of government agencies as well as non-governmental agencies offering short term vocational and skill acquisition programmes

at training centres all over Nigeria. The government agencies include National Open Apprenticeship Scheme of the National Directorate of Employment (NDE), the Industrial Training Fund (ITF), Construction Skills Training and Empowerment Programme (C-STEMP), and National Poverty Alleviation Programme. German Dual Vocational Training Partnership with Nigeria is a non-governmental initiative. There are, however, no statistics to indicate the number of successful trainees produced for the construction sector.

In April, 2013, a National Vocational Qualifications Framework (NVQF) was approved by the Nigerian Government. The NVQF is:

> *"an instrument for the development, classification and recognition of skills, knowledge and competencies acquired by individuals, irrespective of where and how the training or skill was acquired. The system gives a clear statement of what the learner must know or be able to do, whether the learning took place in a classroom, on-the-job, or less formally."* (NBTE, 2014)

It is expected that the NVQF will be managed based on National Occupational Standards to be developed by Sector Skills Councils, similar to the structure for vocational qualifications in the UK and several other Commonwealth countries. The Sector Skills Council for the construction sector in Nigeria has not been established and the National Occupational Standards for the sector are still being compiled. The implication, however, is that when implemented, training offered by the many training agencies including construction firms will be standardised, assessed and certified on the same basis (NBTE, 2014). This allows for the development of creative learning systems appropriate for the construction workplace.

1.3 Problem Statement

The challenge is to investigate how construction firms can develop their human resource (HR) systems and practices such that the learning of skills in the workplace is continuously optimised in alignment with strategies to achieve organisational goals. This raises questions such as, what are the elements required for the development of an effective workplace pedagogy for the construction environment; what are the knowledge requirements of the construction industry for its skilled workers; what proportion of these knowledge, skills and attitudinal requirements for skilled workers are delivered by formal training institutions and what proportions need to be delivered in the workplace to accommodate changing business priorities; what are the attributes required for an individual worker to learn and perform optimally and how can they be achieved through workplace learning systems and practices while aligning learning and performance to organisational goals; which pedagogical approaches are appropriate; and how can learning be integrated into the ways in which construction firms do business without disrupting but rather enhancing the flow of work?

Given these challenges, there is a need to purposefully examine these concomitant forces, their impact and enmeshed interrelationships. The research critically examines these issues through the development of one core aim supported by six objectives, the details of which are presented in the following section.

1.4 Aim and Objectives

1.4.1 Aim

To develop a dynamic, conceptual, skills learning model that enables construction firms to optimise individual worker performance by integrating effective and efficient learning approaches into firms' existing business models.

1.4.2 Objectives

Objective 1: To critically analyse and evaluate the core issues of learning and their application in the construction industry to optimise sector performance.

Objective 2: To critically analyse and evaluate construction business frameworks for modelling workforce learning and development.

Objective 3: To assess the Nigerian construction industry for intermediate skills knowledge requirements and learning provision; and for workforce learning and development practice

Objective 4: To examine the interrelationships and interdependencies of individual attributes and factors of job performance to understand the underlying push-pull forces that deliver or impede effectiveness of learning and performance

Objective 5: To develop a conceptual learning and development model for optimising workforce performance in line with the strategic priorities of construction firms

Objective 6: To test and validate the conceptual learning and development model to confirm construct validity, functionality and replicability

1.5 Methodology

Achieving the objectives of this research involved the investigation of the complex underlying constructs which are shaped by specific organisational and industry contexts as well as perspectives, beliefs, values and experiences of the diverse individuals involved. A pragmatic research paradigm was deemed appropriate for this research in order to accommodate the acceptable theories and knowledge that have practical value in the construction environment (Saunders *et al.,* 2016) and to also accommodate the multiple perspectives of reality in the complex domain that is the construction workplace (Kelemen and Rumens, 2012; Saunders *et al.* 2016).

At an ontological level, the research embraced social constructionism, a view that emphasises social reality as being jointly constructed by social actors interacting in a specific context (Burrell and Morgan, 1979; Saunders *et al.*, 2016). Given the complexity of the construction research domain and the need to allow integration of these diverse processes, perceptions, experiences, practices and interactions involved in learning, construction management and organisation development, at epistemological level, an interpretive and to an extent a positivist slant were prescribed. Interpretive in the sense that collective meaning had to be derived from the perceptions of the diverse individuals involved and positivist because there is considerable evidence of successful transfer of best practices, with appropriate contextualisation, across industries and across countries.

Qualitative and quantitative methods of data collection and analysis were employed as they were deemed appropriate to the specific research objectives to be achieved (Bryman, 2016; Silverman, 2010). On the paradigm “continuum” described by Holt and

Goulding (2014), data for the research tended towards the interpretive end, being subjective in nature and comprising of measures of attitudes, opinions, behaviours and perceptions. However, quantitative data collection and analysis methods were also used to capture and analyse these perceptions.

The first phase of the study identified the core issues involved in designing effective learning solutions for construction skills in line with contemporary learning theory. The constructs and sub-constructs identified for further study were: Nigerian construction industry production processes and impact on knowledge requirements and the quality and ratios of construction skilled workers supplied to industry pool by education/training providers; individual worker attributes (cognitive, emotional, and social) and performance; and construction organisation learning framework These constructs prescribed two units of analysis for the research, the individual worker (learner) and the construction workplace (learning environment). Consequently, in the second phase of the research, two surveys were carried out during the preliminary exploratory phase of the research employing structured questionnaires for data collection. The surveys were to investigate the constructs identified from initial extensive literature reviews to establish their applicability to the Nigerian construction domain. One survey covered the individual worker learning processes while the other survey explored the construction workplace as a learning environment. These two units of analysis were maintained through the next phases of the research.

The complexity of the construction domain and the large number of impinging factors necessitated a case study design to allow for in-depth study of WLD within the context of the construction organisation. The third phase of the research therefore employed a

nested multi-case study design involving one large, one medium and one small construction firm in Nigeria to provide theoretical replication. One survey was embedded into each case study to provide empirical support for a whole person approach to WLD in order to optimise individual performance. The case study design therefore, employed structured tests for the individual worker (learner) unit of analysis and semi structured interviews for the construction workplace (learning environment) unit of analysis. Other sources of evidence were archival documents. Results from the case study phase were integrated to provide the tentative components for the WLD maturity model.

In the fourth phase of the research, the model was further developed and refined using three focus groups from each of the case study firms and all going through three iterations during the process. The three groups were collapsed into one focus group by the final iteration. The Software Engineering Institute (SEI)'s People Capability Maturity Model (P-CMM) was used as basis for developing the Construction Workforce Learning and Development Maturity Model (CLEARDO). In the fifth and final phase of the research, CLEARDO was validated by the participant construction firms, three other construction firms and members of the academia in Nigeria. Figure 1.1 shows a process diagram for the five phases of the research.

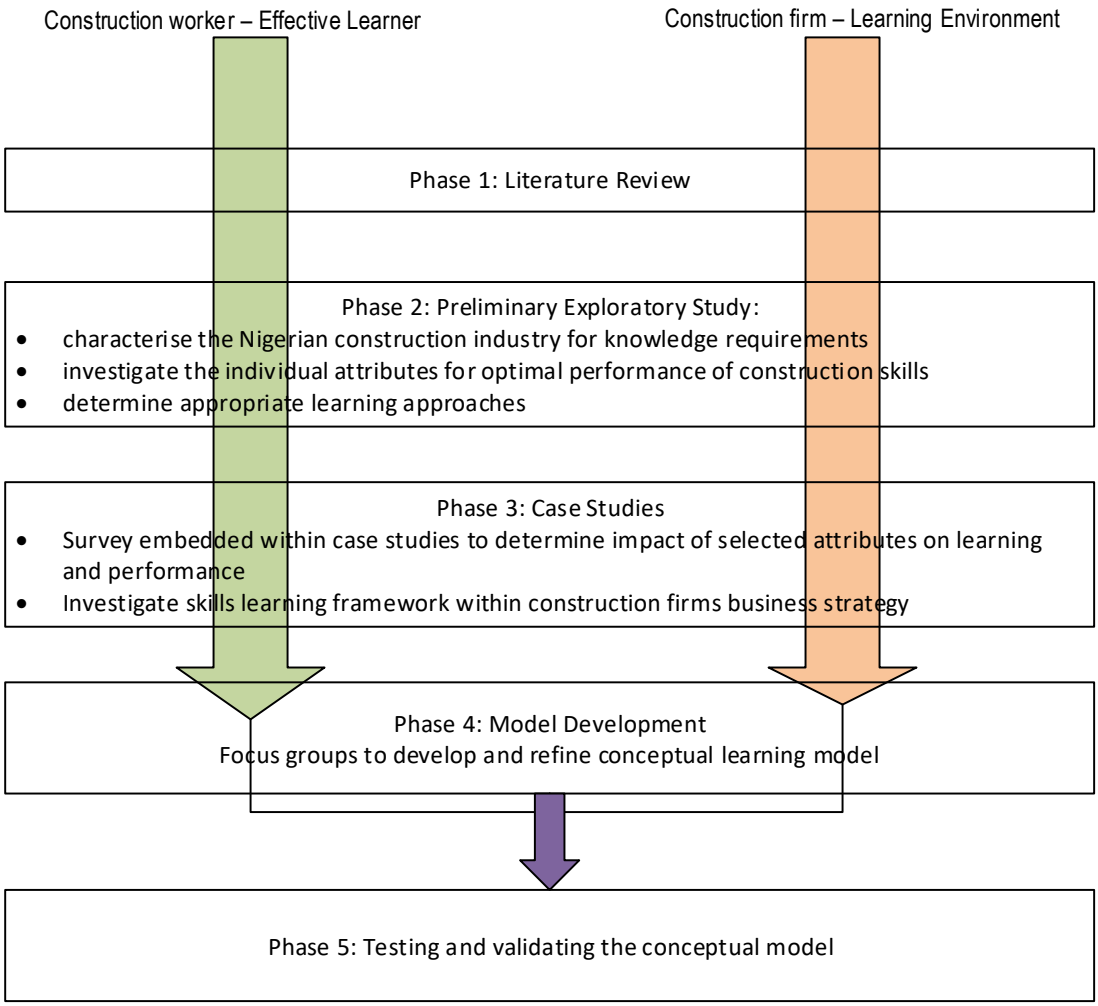

Figure 1.1 Process diagram showing the five phases of the research

1.6 Scope, Limitations and Delimiters

1.6.1 Scope

The research covers the learning and development of construction organisations' workforce and the workplace learning environment. A specific focus of the research was on the individual learning and development issues of intermediate skilled workers (artisans, technicians, supervisors and instructors) within the wider remit of construction organisations' workforce learning and development environments. Intermediate skilled workers are at Level 4-5 of the National Qualifications Framework (NQF) of England, Wales and Northern Ireland (HMSO, 2017) and at Level 3-4 of the Nigeria (NBTE, 2014). Intermediate skills included in the research were artisans and

technicians with or without diploma qualifications (David and Lopez, 2001). The research included psychometric analysis of individual workers in construction organisations, relating learning and performance to cognitive, emotional and social attributes in order to evidence a whole person approach to learning at that level. The research also investigated WLD best practices in the construction organisation workplace. The results were integrated into a WLD model that potentially optimises the entire workforce performance in line with the organisation's business objectives through an evolutionary process of continuous improvement.

The AEC industry, the built environment, the construction sector and the Engineering and Construction industry all refer to the construction industry and no distinctions are made between them in this research.

1.6.2 Limitation

The research acknowledges but does not cover the external factors that impact on organisations. Organisations respond to external influences through adjustments to business objectives and strategy. The design of the construction WLD model incorporates mechanisms that allow organisations to continually adjust learning and performance to align with business goals, including changes in business objectives and strategy brought about by changes in the external environment which impact on the organisation.

1.6.3 Research Delimiters

The research was carried out within the Nigerian construction industry and the model was developed within construction firms in Nigeria. The results of the research could be

generalizable to construction organisations in other countries with appropriate contextualisation.

1.7 Thesis Structure

The thesis is organised into eleven chapters and four appendices. A synopsis of these are presented as follows:

Chapter One introduces the research. The chapter provides a background to the study, the statement of the problem, the aim and objectives of the research, an overview of the method of approach, the scope, limitations and delimitations of the study, definitions of the key constructs studied and a summary of the findings

Chapter Two explores the learning processes for the individual, the underpinning learning theories, the knowledge requirements in the Knowledge Age, and workplace learning from the learner's perspective. The chapter also identifies the individual attributes that underpin learning and performance.

Chapter Three examines the HCD issues of the Nigerian construction industry, construction organisation's business strategy and the ramifications for WLD, workplace learning from a business perspective, the supporting environment for learning, performance management and alignment to business goals. The chapter also identifies generic WLD best practices.

Chapter Four details the research approach taken. It presents the research rationale and describes methodology for each phase of the research.

Chapter Five presents the preliminary exploratory study of the two units of analysis for the research: construction individual learner learning processes; and construction organisation's WLD practices. The study utilised two structured questionnaire surveys to explore construction skills learning in relation to performance from the perspective of the learner and workplace learning from the perspective of the business. It presents analysis of the two surveys and provides the basis for the case studies carried out in the next phase of the work.

Chapter Six presents the analysis for the surveys embedded in the case study design of the research that investigated the relationship between emotional and social attributes of individual workers (learners) with their performance on the job. It also presents analysis of interviews and documents from within each of the three case study firms that establish the construction organisations' learning environment. The chapter discusses the reports for each of the three case study construction firms and a cross case synthesis of the findings. The chapter validates the quantitative findings from the survey in the preceding phase and validates the components of the proposed learning and development model.

Chapter Seven presents the model development methodology for the WLD maturity model and reports on the analysis of focus group discussions to populate and refine the model.

Chapter Eight presents the model, the maturity framework, the maturity assessment tool and the criteria for progression from one maturity level to the next.

Chapter Nine reports on the testing and validation of the construction WLD maturity model carried out within three other construction firms.

Chapter Ten discusses the research findings

Chapter Eleven presents the conclusions derived from the research and suggests directions for future research in construction WLD. The chapter highlights the contributions to knowledge made by the research.

1.8 Chapter Summary

This chapter introduced the research context. The challenge of a global shortage of construction skills at managerial and technical levels was highlighted. The current push for workplace learning and continuous life-long learning brought on by globalisation, the dynamic and rapid diffusion of knowledge, technological advancement and the changing nature of work further emphasised the need for construction organisations to look inwards for the continuous development of needed human capacity in these areas. This further emphasised the lack of a structured approach to continuous WLD within construction organisations globally, in general, and Africa and Nigeria, specifically. The aim and objectives of the research were articulated to fill this gap in knowledge. The methodology used to achieve these objectives was summarised and an eleven-chapter structure for the thesis was outlined.

CHAPTER 2 LEARNING AND DEVELOPMENT

2.1 Introduction

The development of workforce knowledge, skills and attitudes are widely acknowledged in extant literature as being pivotal levers to deliver process improvement and efficiency. It is also acknowledged that learning, education, training and development are the traditional means through which they are acquired. The terms, education, training, development and learning are regarded as synonymous by some whereas to some the terms are distinct (Garavan, 1997). Within the variety of definitions of education, training and development the similar concepts of learning, growth, maturation, and the forming of character, behaviour or ability are incorporated. The distinctions made between the terms mostly relate to when and where each takes place. For instance, education has at some time been understood as a long-term activity that goes on within institutional environments and is targeted at children and young people (Cole, 2002). Training was thought to be concerned with imparting and developing specific skills in the individual for a purpose, usually the acquisition of specific knowledge and skills required for an occupation or task. Training was therefore a relatively short term activity targeted at individuals within an organisational setting. Development on the other hand was seen as a longer term learning activity concerned more with career growth rather than immediate performance. It refers to the nature and direction of the change induced in the individual, the expansion of capacity and to a continuous maturation process (Prasad, 2005; Cole 2002).

The meaning of education has traversed from the traditional view of its being the process by which the older generation passes to the next generation that which it

considers to be true and valuable to a contemporary position where it is viewed as one out of a number of "providers" of learning (Jarvis, *et al.*, 2003). The shift in emphasis from "education" and "training" to "learning" was traced by Jarvis *et al.* (2003) to changes in the social conditions in which education has traditionally functioned. These changes being: globalisation; demographic changes; changes in nature of work and economy from 'Fordist' systems to knowledge economies; privatisation; individualisation and commoditisation. Illeris (2007) attributes the shift to the realities of competition in the present globalised markets and knowledge societies. According to Garavan (1997) training, development and education are essentially concerned with learning and should be seen as complementary components of the same process – the enhancement of human potential. However, Illeris (2007) considers development to be an umbrella term for learning and maturation and therefore learning is a part of development.

Learning as currently conceived is complex and difficult to define because it covers a wide spectrum of conditions (Garavan, 1997). This has resulted in a wide range of definitions of learning. Definitions are either wide enough as to be all encompassing or narrow to align with the definer's school of thought. For instance, behaviourists see learning as a process by which behaviour changes as a result of experience and therefore, learning is essentially externally induced (Garavan, 1997). Cognitive learning theorists view learning as a cognitive process of assimilation or accommodation of knowledge (Illeris, 2007) into cognitive structures of the mind. Social learning theorists position themselves midway between behaviourists and cognitivist where learning is a response to observed behaviour but also involves a mental process of evaluation to determine the appropriate response (Bandura 1977). Illeris (2007) an educational

psychologist opted for a broad definition of learning as "any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing". Jarvis (2009) proposes a comprehensive definition of human learning which reflects its complexity.

> *"Human learning is the combination of processes throughout a lifetime whereby the whole person – body (genetic, physical and biological) and mind (knowledge, skills, attitudes, values, emotions, beliefs and senses) – experiences social situations, the perceived content of which is then transformed cognitively, emotively or practically (or through any combination) and integrated into the individual person's biography resulting in a continually changing (or more experienced) person".*

This definition of learning highlights the importance of a "whole person" approach to human learning as well as the influence of social situations that provide learning experiences. Furthermore, human learning is viewed as a continuous, lifetime process of change.

Designing pedagogy for any domain involves consideration of the three related matters of: the human learning process; the knowledge requirements for each given domain and the appropriate learning methods or approaches to deliver the required knowledge within each context. An optimal pedagogy cannot therefore be designed without first determining the objective of a learning experience and its desired learning outcomes. Learning outcomes are then mapped against current learning theory to determine an appropriate pedagogic approach to WLD. The better articulation and mapping of the processes and desired outcomes of construction learning and development in the

workplace with theoretical perspectives of learning and teaching is expected to provide a pedagogic approach that is efficient and effective (Conole, *et al.,* 2004). This research explores these three interrelated matters of how we learn, what we need to learn and which learning methods work in delivering the content and attributes required for the optimal performance of individuals within the construction environment.

This chapter presents and synthesises the core issues arising from literature on learning, priorities and pedagogical solutions. Specifically, it reviews research in learning approaches for the workplace and explores the adaptability of findings to the construction industry. Furthermore, learning theories underpin the methods of learning and teaching in most subject areas (Pugsley, 2011). This chapter presents reviews of learning theory in order to properly define the individual attributes (desirable learning outcomes) that effect performance in the contemporary workplace. This segment of the literature review is therefore divided into sections that cover learning theories, desired learning outcomes, and learning approaches. The learning context also has significant influence on the appropriate approach to learning and this dimension will be reviewed in the next chapter.

2.2 Learning Theories

This section reviews literature on the educational theories backing the development of working competence and expertise. The classical learning theories can be classified into three main domains: behaviourism, cognitivism and constructivism (Yilmaz, 2011) and each is discussed together with the humanist school which developed as a reaction to the reductionism of behaviourism (Pugsley, 2011). The pedagogical approaches associated with each perspective are also discussed.

2.2.1 Classical Learning Theories

2.2.1.1 Behaviourism

Behaviourism: dominated the educational landscape up to the mid-1980s (Boghassian, 2006); has its origins in the work of theorists such as Pavlov (1955), Watson (1970) and Skinner (1938); and focuses on observable and measurable behaviour (Pugsley, 2011). Behaviourism sees knowledge as empirically determined fact only and is strongly influenced by positivist views and positions (Boghassian, 2006). It was believed that learners undergo some form of conditioning from appropriate environmental influences (external stimuli) resulting in changed behaviour (Bush, 2006). The mental processes of the learner were not given consideration since inner processes were not measurable by available scientific procedures (Hung, 2001). Learning was teacher (expert) focused with the teacher determining what was learned and knowledge was delivered as hard evidence that needed to be memorised. Knowledge was presented in didactic lecture-based formats; skills were taught by demonstration and practice manuals; and attitudes were developed through assessment and reinforcement by the experts (Pugsley, 2011). Competency-based systems of education and training have their origins in behaviourism.

2.2.1.2 Cognitivism

Cognitivism as a learning theory can be traced back to the early twentieth century and grew out of dissatisfaction with behaviourist tradition's failure to explain mental processes (Yilmaz, 2011). The work of theorists such as Tolman (1932), Piaget (1952), Vygotsky (1978) and Bruner (1956) instigated the dramatic shift from behaviourism to cognitivism and by the mid-1950's the impact of cognitive theories in education was described as a 'cognitive revolution' (Bush, 2006; Yilmaz, 2011). Basically, the

cognitivists claimed that prior knowledge and mental processes have greater influence on behaviour and response than external stimuli. Methodologically, cognitivism adopts a positivist approach; its foundations are objectivist; and as with behaviourism, knowledge was initially considered to be distinct and abstract (Hung, 2001).

Jean Piaget (1952, 1954, 1958)'s work in cognitive development though criticised for its earlier weak foundations in empiricism has had tremendous impact on childhood education and learning as well as on instructional design. Vygotsky (1978) concentrated on the interplay between the individual and society; how social interaction and language come into play in effecting learning or the development of cognition; and the key role of culture in learning (Yilmaz, 2011). The cognitivist school views learning as an active process involving the acquisition or reorganisation of the cognitive structures by which humans process and store knowledge. In addition, the learner is an active participant in the process of knowledge acquisition and integration (Yilmaz, 2011). Learning strategies include lectures, class presentations, case studies and reading which are mainly used for the transmission of knowledge; demonstrations, case studies and coaching/feedback are used for the learning of skills; and vicarious experiences and debate for the development of attitudes (Pugsley, 2011).

2.2.1.3 Constructivism

Constructivism as a learning theory is viewed by some writers as a cognitive perspective to learning with the distinction of holding at its core the following concepts: that knowledge is constructed by the learner and developed through experience (Kerka, 1997, Bush, 2006); that there is no knowledge independent of the meaning constructed by the learner or community of learners (Boghassian, 2006); and that learning is situated

within the constructivism philosophical school of thought. Other writers do not distinguish between the cognitive and constructivist learning paradigms using either term to describe the same concepts (Boghassian, 2006; Yilmaz, 2011).

Constructivism as a learning paradigm though grounded in the work of theorists such as Dewey (1922), Bruner (1956), Bruner (1966), Piaget (see Inhelder and Piaget, 1958), and Vygotsky (1978), has become an umbrella term that encompasses many of the more recent learning theories (Pugsley, 2011). Specifically, the social orientations of constructivism commonly linked to Vygotsky (1978), which emphasise the critical importance of interaction with people in cognitive development gave rise to social cognitivism (Hung, 2001) while the situated view of learning and practice spawned theories such as situated learning (Lave, 1991) and communities of practice (Lave and Wenger, 1991).

Key concepts in the constructivist view of learning are: learning is an active process of constructing rather than acquiring knowledge; knowledge can be socially constructed involving a discovery of different perspectives and shared meanings or involving a personal discovery of knowledge generally from first principles; and the interpretation of knowledge is dependent on prior knowledge and beliefs held as well as on the cultural and social contexts through which the knowledge was constructed (Hung, 2001). Consequently, reflection, experiential learning and self-directed learning are key elements in this paradigm. Learning is student centred, with the teacher acting as a facilitator of learning, more concerned with constructing a meaningful context for learning rather than directly teaching specific skills (Kerka, 1997). Learning methods based on constructivism include, cognitive apprenticeship, reciprocal teaching,

anchored instruction, inquiry learning, discovery learning, problem-based learning and case based-discussions (Yilmaz, 2011, Pugsley, 2011).

2.3.1.4 Humanism

Humanism is a paradigm, philosophy or pedagogical approach that views learning as a personal act to fulfil one's potential. The primary purpose of learning is to develop self-actualised, autonomous people. Learning is student centred and the teacher's role is that of a facilitator, encouraging students to learn through active self-discovery rather than response to external stimuli (Pugsley, 2011). Rogers (1969) and Maslow (1943) are credited with originating the humanist movement and they actively brought in the emotional dimension to human learning. Kolb (1984)'s Experiential Learning Cycle, Maslow (1943)'s Hierarchy of Needs, Rogers' (1968) Facilitation Theory and Goleman (1998)'s Theory of Emotional Intelligence (EI) stem from humanism and its focus on the emotional aspects of learning. Learning strategies based on this view include discussion; games for the learning of knowledge; discuss action; project simulation; action plan/contract for the learning of skills and self-assessment and discussion of beliefs for the development of attitudes (Pugsley, 2011). The views that support the need to move away from traditional education and training delivery approaches towards the personalisation of learning have spawned self-determined learning approaches and personalised learning tools (Davis and Hase, 2001; Goulding and Syed-Khuzzan, 2014).

2.3.1.5 Situated Learning

Situated learning is learning that takes place in the same context in which it is applied. It was first proposed by Lave and Wenger (1991) where they argued that learning is a social process in which knowledge is co-constructed and such learning is situated in a

specific culture and embedded within a particular social and physical environment. They describe the process of such learning as legitimate peripheral participation in a "community of practice". A learner becomes part of the community of practice by beginning at the periphery; then becoming more active and engaged within the culture; and eventually gets to the centre where they assume the role of expert (Lave, 1991; Lave and Wenger, 1991; Wenger, 1998). Social interactions and collaboration are essential components of situated learning (Conole *et al.*, 2004). Apprenticeships are based on situated learning theories.

Wenger (2009) discusses a theory of learning as social participation. Participation in the sense of being active participants in the practices of social communities and constructing identity in relation to those communities. The focus is on participation and this has implications for what it takes to understand and support learning. For individuals, this would mean engaging and contributing to the practices of their communities. For communities learning involves refining the practices of the communities and ensuring new generations of members. For organisations, learning would involve: sustaining the interconnectedness of communities; providing ways of engaging workers in meaningful practice; providing access to resources that enhance participation; opening up workers' horizons that put them on a learning trajectory; and involving workers in activities, discussions and reflection that adds value (Wenger, 2009).

2.2.2 Holistic/Integrated Learning Theories

Modern thinking about learning has moved away from the dialectic of behaviourism or cognitivism to more holistic, multidimensional and integrated views about learning that focus on developing the whole person (Kolb, 2004; Illeris, 2007, Hager, 2004). The

following sections summarise relevant models that adopt the whole person (cognitive, emotional and social) approach and draw on multiple theoretical perspectives to explain the nature and conditions of learning within different contexts.

2.2.2.1 Experiential Learning

Experiential learning theory is not a third alternative to behavioural and cognitive learning theories but rather suggests a holistic, integrative perspective of learning that combines experience, perception, cognition and behaviour. Drawing heavily on the work of Lewin (1951), Dewey (1938) and Piaget (1970), Kolb (1984) identified similarities in Lewin (1951)'s Model of Action Research and Laboratory Training, Dewey (1938)'s model of Learning; and Piaget (1970)'s Model of Learning and Cognitive Development which when taken together describe the main characteristics of experiential learning:

- Learning is a continuous process grounded in experience
- Learning is a holistic process of adaptation to the world
- Learning involves transactions between the person and the environment, and
- Learning is the process of creating knowledge (Kolb, 1984)

2.2.2.2 Adult Learning

Studies such as Smith *et al.* (2007) found that mature-aged workers tend to be keen learners; tend to have confidence issues during training; and have propensity for a stronger work ethic and greater life experience than younger workers. Vaughan (2008) notes that mature-aged workers tend to be shy during class discussions; tend to have low literacy levels; and are usually more interested in task-related rather than qualification related-learning. The ways in which adults learn as distinct from the ways in which children learn is referred to as andragogy in some literature. Knowles (1970,

1980) who popularised the concept of andragogy in the US, identified core principles in adult learning that may have some relevance for skills learning in the construction workplace. Adults need to know the relevance of something before they begin to learn; they are capable of self-directed learning; they have a wealth of experience to draw on; they have a readiness to learn what they need to perform effectively; adults need to be orientated to learning that has real-life application; and adults respond best to internal motivation (Knowles *et al.,* 2015). Lucas *et al.* (2012) suggest that these factors together tend to produce learners who are more self-directed and less dependent on the pedagogic decisions taken by those facilitating their learning.

This section and the previous section have reviewed theories on how the individual learns and some of the contextual factors that facilitate learning. The next section reviews the human capabilities to learn.

2.2.3 Intelligence and Learning

2.2.3.1 A Definition of Intelligence

> *"Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment"*
>
> (Wechsler, 1944, pp 3)

Salovey and Mayer (1990) refer to Wechsler (1944)'s statement as the most cited definition of intelligence. This definition they argue has the advantage of encompassing a wide range of definitions from the restrictive (ability to carry on abstract thinking) to the historical broad areas of Abstract Intelligence, Mechanical Intelligence and Social Intelligence. Furthermore, contemporary theorists such as Gardner (1983) and Sternberg *et al.* (1981) proposed distinctions that have further broadened the

conceptualisation of human intelligence. Sternberg *et al.* (1981) conducted experiments to discover people's conceptions of intelligence and even though there were differences across groups, there appeared to be a common core of behaviours associated with intelligence in the belief systems of individuals and these included: problem solving; verbal facility; social competence and possibly motivation.

2.2.3.2 Multiple Intelligences

The notion of multiple intelligences introduced by Gardner (1983) was based on empirical evidence that the human mind was quite modular in design with separate psychological processes being involved in dealing with language, numbers, pictures, movement and other symbolic systems (Gardner *et al.*, 1989). Bar-on (2006) cites neurological evidence suggesting that while the dorsolateral prefrontal cortex is thought to govern key aspects of cognitive functioning, the neural centres governing emotional-social intelligence are located in a different part of the brain, the ventromedial prefrontal cortex. Bush (2006) discusses results of brain research which appear to support the concept that sections of the brain operate as individual systems and that the brain alters itself based on experiences. Emotions also play a major role in the functioning and processing of the brain. Despite the relative infancy of brain research, educational scholars consider it worthwhile to apply these concepts to detect learner strengths and weaknesses and using these as basis for engagement in learning and to help students learn with all deliberate speed (Gardner, 1989; Bush, 2006).

Gardner (1983) originally identified seven intelligences, logical-mathematical, linguistic, musical, spatial, bodily-kinaesthetic, interpersonal and intrapersonal, to which an eighth, naturalistic, was added and consideration was given to adding existential and

moral intelligence as a ninth (Gardner, 2011). Goleman (2001) describes the interpersonal and intrapersonal intelligences as personal intelligence which he relates to the core basic concepts of the Emotional Intelligence (EI) construct: self-awareness and self-management (interpersonal intelligence); and social awareness and relationship management (intrapersonal intelligence).

Boyatzis and Saatcioglu (2008) identify a set of competencies described as "the underlying characteristics of a person that lead to effective or outstanding performance" and it includes abilities from three clusters: cognitive intelligence competencies, EI competencies and social intelligence competencies. These three sets of competencies appear to relate to Illeris (2003) three-dimension model for effective learning comprising the cognitive, emotional and social dimension.

2.2.3.3 Emotional Intelligence

As a theoretical construct, EI is very new (Goleman, 2001). Bar-On (2006) and Goleman (2001) trace the evolution of the concept from Darwin (1872)'s scientific studies to Thorndike (1920)'s definition of the concept and to Weschler (1950)'s acceptance of affective capacities in human capabilities. Leuner (1966) coined the term "emotional intelligence" and Gardner (1983)'s model of multiple intelligences included the personal intelligences of interpersonal (emotional) intelligence and intrapersonal (social) intelligence. In his doctoral thesis, Bar-On (1988) attempted to measure EI as a measure of well-being. He used the term emotional quotient (EQ) long before it became popular. Salovey and Mayer (1990) define EI as a subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and use this information to guide one's thinking and actions. EI has emerged as a

paradigm which has significant impact on individual performance. Studies have shown that EI correlates significantly with employee capabilities (Behbahani, 2011) and is a strong predictor of performance (Salovey and Mayer, 1990). Goleman (1998) claims that for all jobs in every field of endeavour, emotional competence is twice as important as cognitive abilities and accounts for virtually the entire advantage in leadership positions. EI competencies can be learned and capabilities developed through appropriate training mechanisms (Salovey and Mayer, 1990; Goleman, 1998; Nelis *et al.*, 2009; Zhang and Fan, 2013).

Goleman (1995, 1998) popularised EI. His views on emotional competence as a learned capability were based on EI that results in outstanding performance. Goleman (1998) identified 25 competencies which fall into five categories, three of which are intrapersonal and two are social (interpersonal). Personal competence includes: self-awareness (emotional awareness, accurate self-assessment and self-confidence); self-regulation (self-control, trustworthiness, conscientiousness, adaptability and innovation); and motivation (achievement drive, commitment, initiative and optimism). Social competence includes: empathy (understanding others, developing others, a service orientation, leveraging diversity and political awareness); and social skills (communication, conflict management, leadership, change catalyst, building bonds, collaboration, cooperation and team capabilities). Goleman (2001) presented the results of studies that indicated that emotional competence accounted for more of the variances in job performance, career success, managerial competence, outstanding performance than cognitive competence.

Bar-On (2006) argues that it is more accurate to refer to the "emotional intelligence" construct as "emotional-social intelligence" because models of EI (Gardner, 1983; Salovey and Mayer, 1990; Saarni, 1990) invariably include interrelated intrapersonal (emotional) and interpersonal (social) competencies, skills and facilitators that combine to determine effective human behaviour. This aligns with Goleman (2001) who identified four major EI domains shared by all main emotional intelligence theories: self-awareness and self-management (intrapersonal); social awareness and relationship management (interpersonal). He acknowledges that the terms used to refer to them may differ, however. The Bar-On (2006) model of emotional-social intelligence covers five main domains: intrapersonal; interpersonal; stress management; adaptability; and general mood.

Salovey and Mayer (1990) argue that a deficit in EI may result in many problems in personal adjustment. This may lead to inability to plan a fulfilling life resulting in depression; impoverished emotional experience leading to sociopathic behaviour; and inability to regulate behaviour and becoming enslaved to emotions.

These distinctions in forms of human intelligence have helped to explain individual differences in performance. General intelligence has been found to relate positively with performance, however, studies suggest that social-emotional intelligences are required in addition for outstanding performance (Behbahani, 2011; Boyatzis and Ratti, 2009; Boyatzis and Saatcioglu, 2008; Goleman, 2001). These studies also suggested that social-emotional intelligences can be learned and they can be developed.

2.2.3.4 Relevance of Intelligence to Learning

The link between intelligence and ability to learn has not been so straight forward. Earlier studies to determine the relationship between learning and intelligence obtained conflicting results. For instance, Diseth (2002) found that although approaches to learning and intelligence, on their own, were predictors of performance (academic), there was a negative correlation between them. Carver and DuBois (1967) noted that most previous research had failed to find a significant relationship between intelligence and learning when certain types of gain measures were used. Jensen (1989) found the correlation results paradoxical, given that both concepts were dependent on the same cognitive processes. Perhaps the explanation can be found in the theory of fluid and crystallised intelligence (Horn and Cattell, 1966).

Fluid and crystallised intelligence are discrete factors of general intelligence (g) where Fluid Intelligence (Gf) refers to the ability to solve new problems, use logic in new situations, identify patterns and abstract reasoning while Crystallised Intelligence (Gc) is defined as the ability to use learned knowledge and experience (Thorsen *et al.,* 2014). Gc is therefore more amenable to change while Gf is considered innate. When new facts are learned, an individual's knowledge expands and the potential for using knowledge and experience to solve problems expands. This explains why ability to learn correlates positively with fluid intelligence in the young learner (Filickova *et al.,* 2015; Thorsen, *et al.*, 2014), while in adult learners, other factors have to be considered. For instance, Lee, *et al.,* (2015) found from experiments with adult learners that with more structured training regimens, individuals with lower fluid intelligence learn as proficiently as those with higher fluid intelligence. However, Thorsen *et al.* (2014) suggest that paying

attention to higher-order thinking skills such as critical thinking, or problem-solving in teaching and assessment in early school years could improve fluid intelligence.

The relevance of intelligence to learning and learning to intelligence and learning and intelligence to performance has implication for the development of pedagogy. Addressing individual differences in intelligence is important for developing effective learning experiences (Lee *et al*., 2015). For learning in the workplace, structured training regimens may be beneficial for learning for a diverse workforce (adult learners) with varying levels of fluid intelligence. The next section looks at the relevance of knowledge in the development of competence and expertise.

2.2.4 Knowledge, Learning and the Development of Expertise

This section reviews the types of knowledge required and the process for developing competence and expertise. Various learning processes and the types of knowledge they rely on have been identified in literature as relevant to vocational areas of study. Procedural knowledge also known as practical knowledge and often described as "knowledge how" is knowledge exercised in performing a specific task. It is tangible and observable. Propositional knowledge also known as descriptive, theoretical or declarative knowledge and sometimes described as "knowledge that" is the knowledge of facts. This form of knowledge is conceptualised and symbolised information that needs to be processed mentally to have meaning (Poikela, 2004).

Practical knowledge can be tacit knowledge in the sense that it is difficult or impossible to transfer to another person either verbally or in writing or it could be explicit knowledge in the sense that it has been codified as rules, procedures or maxims

(Brauner *et al.,* 2005; Guzman, 2009; Lucas *et al.,* 2012). Tacit knowledge also includes knowledge which Nonaka (1991) describes as highly subjective insights, intuitions, and hunches of individuals, the realm in which new knowledge is created and innovation thrives. It is highly personal and though difficult to formalise can be transferred through socialisation, an apprentice learning his master's skill through observation, imitation and practice, for instance. This form of transfer is limited in scope and can only benefit and transform an organisation when it is articulated and made explicit (Nonaka, 1991). Tacit knowledge therefore needs to be made explicit so that it can be shared with novices and within the learning system (Eraut, 2000; Poikela, 2004; Brockmann *et al*., 2008).

Brockmann *et al*., (2008) note that it is the level of integration of practical knowledge and theoretical knowledge that marks a major distinction between the English and Continental Vocational Education and Training (VET) models. The English model relies heavily on practical knowledge while the Continental model is dependent on theoretical knowledge as foundation to practical knowledge. Poikela (2004) illustrates how various knowledge forms integrate to form competence and expertise in Figure 2.1

Poikela (2004) introduces two dimensions of knowledge into the learning process, potential and experiential knowledge. Potential knowledge is the learner's ability to learn or ability to engage with and process knowledge. The engagement on a personal level with theoretical and practical knowledge is necessary for producing experiential knowledge in the learner. Experiential knowledge is gained through experience. Facts, concepts symbols, rules, situations and events can be ignored or left behind, it is only the experience of these if internalised that become portable personal knowledge for the

learner. The report concludes that producing experiential knowledge should be the goal of education as it enables continuous learning at work.

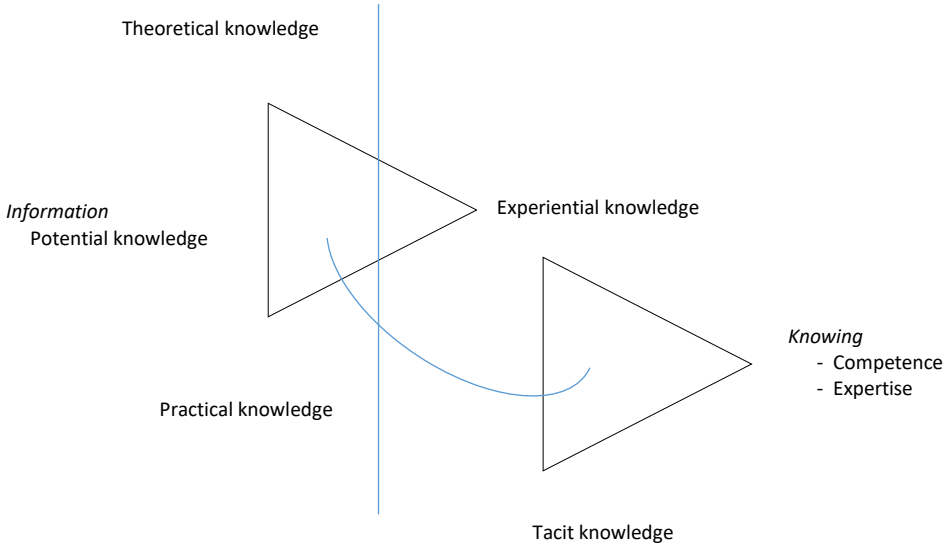

Figure 2.1 Information, knowledge and knowing

Source: Esa Poikela (2004)

Rauner (2007) introduces the concept of vocational identity as a goal of vocational learning along with vocational competence. The process by which this translates into commitment, performance and quality awareness is one that theory and research have, however, not discovered. Despite this, Poikela (2004) argues that innovation and competitiveness of organisations seem to depend to a degree on the skills and competence of the workforce. This is intuitively transparent and has been shown from research. Poikela (2004) concludes that innovation know-how which is the fundamental for competitiveness in high-tech industries is based on the interplay between experiential, practical and scientific knowledge.

The process of internalising knowledge or developing experiential knowledge can be explained by Kolb's experiential learning cycle made up of four stages as in Figure 2.2:

concrete experience which comprises a new experience of a situation or a re-interpretation of previous experience; reflective observation of the new experience; abstract conceptualisation where reflection leads to a new idea or concept or modifies an existing abstract concept; and active experimentation – the learner applies the new concept to the world around to see what happens. The learner may enter the cycle at any stage but must complete every stage for effective learning. None of the stages is an effective learning experience on its own.

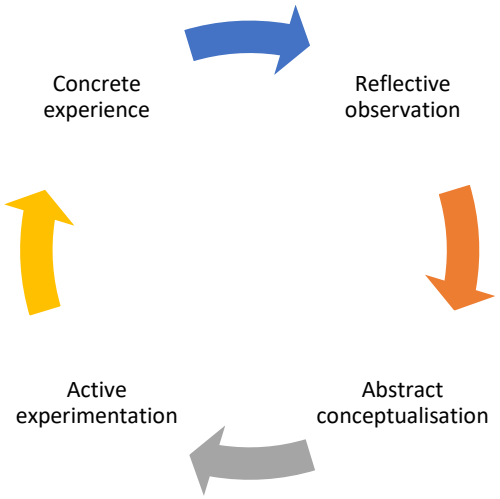

Figure 2.2 Cycle of experiential learning

Source: Kolb (1984)

Blunden (2006) describes the process for developing competence in the context of teacher and trainer preparation. Novices observe experienced individuals at work with the aim of distilling what effective practitioners do and attempting to mimic them. This is followed by feedback then reflection and further observation. The process is viewed as cyclic or spiral with the novices progressing from little understanding and skill to increasing complexities of understanding and performance and not linear or 'lock step' as suggested by the stages of skill development outlined by Dreyfus and Dreyfus (1986): in Figure 2.3

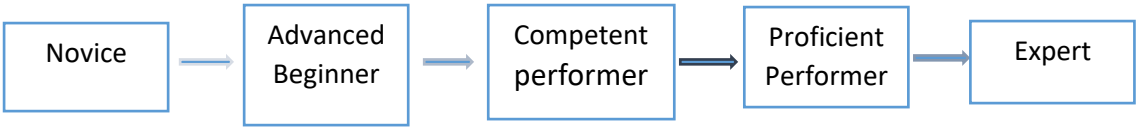

Figure 2.3 Stages of skill development

Source: Dreyfus and Dreyfus (1986)

Billet (1992) posits that adaptability and higher order functions are dependent on a substantial base of procedural and propositional knowledge. However, natural and authentic settings provide optimal opportunities to develop procedural knowledge and higher order thinking while theory type settings have an inherent quality of placing learners in a passive low-order thinking mode. Higher order thinking is required for the development of personal knowledge which is portable and can be applied in novel situations. Practical, procedural and potential knowledge develop experiential and thereby personal knowledge which is portable and leads to the development of expertise (Poikela, 2004).

The challenge for WLD is therefore to ensure the provision of knowledge sources pertinent to the workplace and to support workers to engage with and apply the knowledge. This is particularly critical in the knowledge age. The next section explores the challenges of and opportunities in learning in the knowledge age.

2.2.5 Learning in the Knowledge Age

Knowledge and ideas are currently recognised and accepted as the key resource (Drucker, 1969), the main source of economic growth, and more important than land, labour, money and other tangible resources in the Knowledge Age (NZCER, 2014; World Bank, 2000). Demir, *et al*. (2015) define knowledge as an "intellectual product" or

"something learned" that is acquired by thinking, judging, reasoning, reading, observing, and testing. Similarly, Davenport and Prusak, (1998) define knowledge as a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information - it originates and is applied in the minds of knowers.

The implication is that knowledge is the product of human intellectual activity and the input for intellectual processing. With each information processing cycle new knowledge is created by the human mind. In this process of knowledge development there are two assets, people (creative beings) and information. In this sense society constitutes a factory for new knowledge (United Nations, 2005). In this regard, the two-fold challenge for the construction industry in establishing knowledge societies is to sustain the development of creative people and to provide channels for information flow.

It has been noted that where ICT is deployed in information production, diffusion and utilisation, massive amounts of new meaning, knowledge, ideas, and innovation are generated (Oblinger, 2012; United Nations, 2005). This process of generating new knowledge has grown in efficiency in the past few decades and has accelerated to the point where knowledge tends towards transience (Toffler, 1970). Manuti *et al.* (2015) record that skills and competencies in the workplace become rapidly outdated in these fast paced contexts. Furthermore, Powell and Snellman (2004) define a knowledge economy as "production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advancement, as well as rapid obsolescence".

The nature of knowledge has changed from the behaviourists' foundations of its being distinct and abstract (Hung, 2001) to its being like some form of energy, dynamic and able to do things or make things happen (NZCER, 2014). Understanding this dynamic characteristic of knowledge is key to articulating the means for acquiring it (learning) in the knowledge age. Given the exponential expansion of knowledge, its transience and accessibility, it may no longer be viable for educational institutions to input all the knowledge required for working life into students during the school years (WEF, 2017). Lifelong learning and the individual's ability to learn continuously has therefore become critical (Illeris, 2007). An integration of the learning of industry specific abilities with the abilities and resources required for effective, efficient and continuous learning both in school and in the workplace, are required (Illeris, 2007).

According to Britz *et al*. (2006), to become a knowledge society, a group needs to meet four interrelated criteria: ICTs and connectivity; usable content (knowledge that is affordable, available, timely, relevant and readily assimilated); infrastructure and deliverability; and human capital.

Germaine to this discourse is the concept of shared spaces for knowledge generation also known as creative networks which are described as the foundation for the creation of individual or collective knowledge (United Nations, 2005). These spaces could be physical, virtual or mental or any combination of them and they could also function at individual, group, organisational, industry or societal level. The shared spaces are characterised by participants who share time and space and transcend their own limited perspectives or boundaries. This concept aligns with the mode of knowledge generation in the built environment which is categorised as "applied practice-oriented knowledge

production" and involves multi-disciplinary teams' inclination to innovate by trying to bring new approaches to bear on intractable problems within the field, or to develop more effective ways of dealing with routine issues (Griffith, 2004).

In the knowledge age, context for learning has moved beyond 'school' to encompass, the workplace and even the home (Davis and Hase, 2001; Eraut, 2004; Manuti, *et al*., 2015; Vaughan 2008). Connectivism (Siemens, 2004) and generativism (Carneiro, 2010) are contemporary learning theories that aim to explain learning in the digital age. The argument is that behaviourism, cognitivism and constructivism do not adequately accommodate the impact of advancements in technology in the learning process.

The underlying principles of connectivism are that learning is a process of connecting specialised nodes or information sources and that capacity to know is more critical than what is known. The reasoning is that knowledge is no longer acquired in a linear manner because chaos, complexity, and the increased interconnections in differing fields of knowledge create an ever-shifting reality. Knowledge, information and learning now reside in diverse opinions and also in non-human appliances. It is not now possible for an individual to know and experience everything that they have to deal with in life and as such the process of learning involves making the connections between the diverse sources of knowledge, choosing what to learn to solve the current problem by drawing distinctions between important and unimportant information, and being able to detect patterns in the information and to recognise when new information alters the landscape on which the decisions of yesterday were made. The capacity to know more now becomes more critical than what is currently known (Siemens, 2004; Steffens, 2015).

Generativism describes learning as an activity which generates new knowledge out of previously codified knowledge involving a constant re-creation of knowledge, deriving new meaning from experience and building sense out of a shared body of conventional knowledge. Learning is collaborative rather than individual (Steffens, 2015).

Knowledge societies are not only about technological innovations but also about human beings, their personal growth and individual creativity, experience and participation (United Nations, 2005). The development of this personal aspect of human capability should therefore not be ignored. Two significant considerations in effective HCD are first that learning has no end-point but is a lifelong process, and secondly, the ability to learn involves more than the cognitive but also has social and emotional dimensions (Billet, 2004; Blunden, 2006; Bruner, 2009; Goleman, 1998; Hager, 2004; Illeris, 2002; Illeris, 2007; Jarvis *et al.*, 2003; Kolb, 1984; Vaughan, 2008).

Poortman, *et al*. (2011) present qualitative case studies whose findings indicate that workplace learning is a result of a process taking place in three dimensions: the interaction (social); and incentive (emotional); as well as the content (cognitive) dimensions. These factors should be identified and adequately considered in the design of learning environments in each context. A pre- post-test with control group research design to assess the whole person approach to skill learning found that although teaching executive skills using a whole person experiential pedagogy approach takes substantial energy, the results, however, are often worth the increased effort (Hoover, et al., 2010).

Junnonen (1998) noted that change and even turbulence characterise the construction business environments keeping knowledge requirements dynamic. This is even more pronounced in the knowledge age. Ofori (2003) suggested that in order to benefit from knowledge-based economies, construction firms need to restructure, adopt new corporate orientations, and adopt suitable developments from other sectors.

In summary, learning in the knowledge age involves creating environments or spaces where knowledge can be accessed, processed and utilised and where the generation and sharing of new knowledge is enabled and supported. It also requires the development of individual capabilities for learning continuously. The emerging field of the learning sciences is one that is interdisciplinary, draws on multiple theoretical perspectives to build understanding of the nature and conditions of learning and development within context (Barab and Squire, 2004). Learning therefore relies on a different set of human capabilities from those traditionally developed in educational institutions. The skill set for workers has expanded to include the following abilities: to locate, assess and represent knowledge; ability to communicate knowledge to others; ability to work productively in collaboration with other people; the abilities to learn, unlearn and relearn; adaptability; creativity; innovative skills; self-awareness; and most importantly, self-directed learning abilities (Toffler, 1970; Kostos, 2006; NZCER, 2014). These suggest that new learning paradigms both at school and beyond school may be required (Kostos, 2006).

The next section reviews the skill sets and/or attributes required for effective learning and performance as a first step in determining the essential attributes required by intermediate skills construction workers for effective learning and optimal performance.

To achieve this, the section first examines the concept of competence at vocational skills level and then proceeds to determine the attributes needed for competence.

2.3 Desired Learning Outcomes: Competence, Expertise and Performance

2.3.1 The Concept of Competence in Vocational Education and Training

In knowledge-based societies where economies have moved from Taylorist-Fordist systems of mass production dependent on narrowly defined tasks and strict divisions of labour, organisations are characterised by greater use of technology, flatter hierarchies, elimination of middle management, less supervision, more responsibility and authority at lower levels, employees deployed across functions and departments, multitasking and multi-skilled (Washington, 1998; Additively, 2003; Brockmann *et al.,* 2008). Ardichvill (2003) notes that today's organisations are now expected to be leaner with better motivated workforces that are more productive, innovative, effective and efficient. This cannot be achieved without the development of appropriate learning systems that focus on the workforce for the intermediate skills sector (Rauner, 2007).

In recognition of this, several reform initiatives have emerged in the VET systems of industrialised economies. In the UK, for instance, there has recently been a growth of interest in the development of vocational pedagogy. An Institute for Learning (IfL) report (Harkin, 2012) produced for the McLoughlin Commission on Adult Vocational Teaching and Learning, highlighted this in their recommendations. Interest has developed in determining "what works" in vocational education. Report on a research commissioned by the City and Guilds Skills Centre for Skills Development (Lucas *et al.,* 2012) notes that vocational pedagogy is an un-researched and un-theorised area that requires further investigation. The Richard Review of Apprenticeships recommends reforms to modern

apprenticeships to ensure efficiency in learning and delivery of the learning outcomes that enhance performance of employers (Richard, 2012).

For the construction sector, there is a growing recognition that learning outcomes need to span more than mere skills but should include underpinning knowledge and personal attributes such as responsibility, quality of work ability, job knowledge, experience, efficiency, accuracy, judgement and initiative, capacities for learning faster and for finding solutions to novel and complex problems (Cheng *et al*., 2007; Tabassi *et al*., 2011) The overarching goal of education and training is working competence and the primary outcome expected is expertise or "superior performance" in the chosen field of study (Lucas *et al*., 2012). The question of what constitutes working competence for construction workers, however, remains unresolved. Moore *et al.* (2002) in an attempt to define competence, identify three layers in performance assessment applied by different demographic groups. Competence in an area of work is determined by an individual exhibiting the correct or relevant behaviour(s) that support the area of work (competency). Competency in turn will depend on the individual having the attributes (competencies) that underpin the relevant behaviour.

Brockmann *et al.*, (2008) describe two VET models that sit at two extremes of a continuum with systems based on tightly regulated inputs at one end and those based on outcomes at the other end. Figure 2.4 shows this continuum with German, Swiss and Austrian VET systems sitting on the side of "education for occupation", while the UK system sits at the opposite extreme of "employability". The Netherlands and the USA VET systems are situated at points in between.

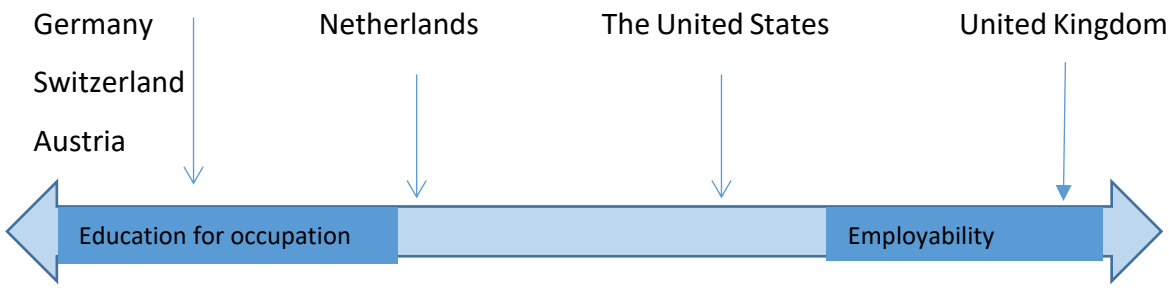

Figure 2.4 Inputs based VET systems - output based VET systems continuum

Source: Developed for this research based on Blunden (2006); Brockmann *et al.* (2008); Clarke and Wall (1998); Delamare Le Deist and Winterton (2005); Euler (2013)

VET systems at the education for occupation end of the spectrum are designed to achieve ability to function in an occupational field. Qualifications are obtained through successful completion of courses which are developed through negotiation with social partners (trade unions and employees) and integrate theoretical knowledge and workplace learning. These courses have a strong knowledge base with focus on occupational mobility of individuals. At the other end of the spectrum, the UK VET system provides a market of qualifications which enables individuals to enhance employability through certification of competence acquired either through work experience or through courses in a modularised system. The nature and type of competencies are determined through market mechanisms and decisions made by individuals to enhance their careers or income (Brockmann *et al*., 2008). This strong, demand-led system has resulted in a narrowing down of "skills" and a further weakening of the knowledge base. Clarke and Winch (2006) claim that thus, the UK VET system places greater emphasis on skills as opposed to knowledge.

The above classification agrees with Rauner (2007) who notes that the VET systems based on education for occupations have features that correspond with the coordinated market economies of central European countries like Switzerland, Germany, Austria and

Denmark while the employability scenario corresponds with the features of liberal market economies exemplified by the UK and the USA.

The Germany-Netherlands approach is described as a multi-dimensional competence development model as opposed to the functionalist-behaviourist Anglo-Saxon model dominant in England each underpinned by distinct epistemological assumptions (Brockmann *et al. (2008)*. The former approach is characterised by the employee taking an active role in constructing knowledge; competence understood to be the ability to deal with complex work situations drawing on multiple resources that the employee brings to the workplace; competence being holistic relating to the whole person and including different dimensions (occupational, personal and inter-personal); and development of competence and personal growth both through VET and work experience. Competencies in initial VET are linked to curricula; are negotiated by social partners; and incorporate the interests of both employer and employee. With the functional-behaviourist approach on the other hand, the employee is passive, focus is on developing competencies to meet employers' specifications, is not tied to curricula, and is assessed in terms of output or performance to required standards. (Delamare le Deist and Winterton, 2005; Brockmann *et al*., 2008)

The arguments for and against competency-based training (CBT) in the construction industry has produced two opposing schools of thought. At one end of the divide, the thinking is that when training content is focused on outcomes (competency standards), narrow skills are developed without the underpinning knowledge, making learning inflexible and non-transferable (Clarke and Wall, 2000; Clarke and Winch, 2006; Blunden, 2006; Rauner, 2007). Proponents of CBT argue that competence by definition

infers the possession of the underpinning knowledge and that a competence based approach to education and training is flexible leaving the providers with the responsibility of deciding the knowledge and skills required to produce the desired level of competence (Mandon and Sulzer, 1998). Another argument is that what people can do is more important than what they know. Blunden (2006), however, postulates that the mind dependence of practical skills needs to be discovered to improve pedagogic practice and vocational effectiveness. In an attempt to resolve the dialectic of knowledge-based and competence-based VET systems, the next section takes a step back to examine the concept of competence in the light of educational theory.

Mulder *et al.* (2007) identify three main approaches to and definitions of competence in VET, the behaviourist, the generic and the cognitive. The behaviourist approach stresses the importance of observing and imitating successful and effective job performers. The generic approach is aimed at identifying the common abilities that explain the variations in performance. The cognitive approach includes the mental resources that are used to master tasks, acquire knowledge and achieve a good performance. A critical analysis of VET approaches to developing competence in England, France, Germany and the Netherlands concluded that behaviourist methods are outdated and should be replaced with a multidimensional holistic approach in determining required competencies and the underpinning knowledge (Mulder *et al.,* 2007).

Hager (2004) presents an argument in the competence/education debate which is based on educational theory. Both arguments for knowledge-based VET systems and competency-based systems are viewed as flawed because they both conceptualise learning as a product rather than a process and run together items that are logically

distinct, namely: performance and its outcomes; the underpinning constituents of competence; and the education and training or development of people to be competent performers. Competency standards describe “performance at selected stages in the learning process”; they specify functions and tasks; and are different from knowledge and skills. The constituents of competence are the diversity of human attributes or properties of people that underpin performance. They include knowledge, skills, attitudes, drives, motivations, emotions, abilities, capabilities and much more. Hager’s (2004) argument was that the constituents of competence are individual, non-transparent and non-replicable and therefore cannot be measured or standardised. They can, however, be inferred from performance which can be measured using the abstraction of standards set for a particular purpose. But more importantly, the constituents of competence can be learned, they can be developed and they can be strengthened by learning (Hager, 2004; Illeris, 2007).

The role of learning and development is therefore to understand the human attributes that underpin performance and to devise and implement strategies for bringing about and enhancing learning. Attributes such as, ability to analyse a situation, ability to reflect, ability to plan, ability to gather pertinent information can be learnt formally as content (product) but these in turn also enable learning processes whether formal, non-formal or informal (process) (Hager, 2004).

2.3.2 Cognitive, Emotional and Social Dimensions of Vocational Learning

An optimal pedagogy is designed with reference to the important related matters of: the learning processes of human learners; the desired outcome of the learning experience derived from the intrinsic demands and constraints of the particular domain;

the learning methods available; and the available resources (Lucas *et al.*, 2012). In addition to profession specific skills, a number of generic but key competences have been articulated as essential for life-long learning in the 21st Century and they include: communication; mathematical competence; digital competence; self-regulated learning capabilities; social and civic competence; sense of initiative and entrepreneurship; and cultural awareness and expression (European Council, 2006). These generic competences encompass not just cognitive but also emotional and social competencies. Effective learning requires synergy between the three human dimensions of cognition (which deals with the content of knowledge: information, skills, opinions, and attitudes), emotions (which provide the energy, drives, motivation and incentives for learning) and the social dimension (which provides the capabilities for interaction, communication and cooperation with the outside world) (Illeris, 2002). Boyatzis and Ratti (2009) identify a set of competencies described as "the underlying characteristics of a person that lead to effective or outstanding performance" and it includes abilities from three clusters: cognitive intelligence competencies, EI competencies and social intelligence competencies. These three sets of competencies appear to relate to Illeris (2002) three-dimension model for effective learning comprising the cognitive, emotional and social dimension.

Much of formal education has traditionally focused on developing the cognitive abilities without giving enough attention to the development of emotional (intrapersonal) and social (interpersonal) competencies. Cognitive ability as a predictor of either academic performance or job performance has been well established in research and in literature. Cognitive abilities alone merely deliver threshold competencies for academic success, getting a job and doing the job, however, outstanding performance and effective human

behaviour require emotional and social intelligence based abilities as studies have shown (Bar-on, 2006; Goleman, 2001). Salovey and Mayer (1990) conclude that emotional skills are necessary for a minimum level of competence and for adequate intelligent functioning.

The actual scope of vocational learning is evidently much wider than knowledge and skills; it is an on-going process that reshapes the learner and sets up a network of relations that goes beyond the learner to impinge on the environment (Hager, 2004). Illeris (2003) posits that the modern concept of competence is broader than relevant knowledge and skills but also includes a range of personal qualities and the ability to perform adequately and flexibly in well-known and novel situations. The concept of learning must be understood in the same broad sense. A theory of learning is presented which includes two processes, an external interaction process between the learner and her social, cultural and material environment; and an internal psychological process of acquisition and elaboration where new impulses connect with results of prior learning. Illeris (2003) also theorises that all learning is made up of three dimensions, the cognitive, the emotional and the social dimensions.

The cognitive dimension is made up of learning content (knowledge and skills) and the wider abilities to think, learn, and grow. It builds up the learner's functionality. The emotional or psychodynamic dimension provides the mental energy, feelings and motivations for learning. Both the cognitive and emotional dimensions are integrated into the internal interaction process which is individual to learners. In Illeris (2002) the internal or personal attributes that need to be developed for competence are outlined as: intellectual, perception, self-control, individuality, social and motivational attributes.

The social dimension is the external interaction process. Learning occurs in an interaction between internal interaction processes and social interaction processes. It comprises both direct interaction with people and the individual's interaction with the material, the societal and the media-transmitted world. The interaction may take various forms: perception of the surrounding world; transmission where someone deliberately passes on information or influence generally or specifically to others; experience where the learner is not just receiving but also acts in order to benefit from the interaction; imitation of another person who acts as model; activity where the learner is involved in a goal directed endeavour; and participation in a common goal-directed activity in which the learner has a recognised position and influence.

Illeris (2003) concludes that traditional learning theory with its focus on the cognitive dimensions of learning is inadequate for dealing with the most significant developments and problems of adult education and life-long learning. The cognitive, emotional and social dimensions of learning and the interactions between them need to be acknowledged and brought into focus when developing or designing pedagogy for vocational learning. Blunden (2006) argues that there are no skills, competencies or capabilities that do not have a cognitive or intellectual component and that this in fact influences the level of expertise or skilfulness of performance or the ability to acquire and develop skill. However, Blunden (2006) also insists that a lack of motivation or a lack of maturity will influence a person's ability to acquire skills suggesting that the learning of skills has both cognitive and emotional dimensions.

In summary, there is a need to review the concept of competence for construction workers in line with modern learning theories accepting that it is made up of more than

mere knowledge and skills. Expertise and excellence in practice are a function of a holistic and integrated process of learning requiring cognitive, emotional and social attributes. The challenge for workforce learning and development therefore lies in a holistic determination of the attributes that an individual worker requires to learn effectively and to perform optimally and then to provide appropriate learning experiences. Previous learning, mental abilities, motivations, dispositions and socialisation of the worker are all factors for consideration in the complexity of effecting the behavioural change known as learning. This mix of factors are as dynamic as they are resistant to change. The next section explores the complexity of learning while at work.

2.4 Learning Approaches: Workplace Learning

2.4.1 Underpinning Theory and Justification

Cullen *et al.* (2002) argue that workplace learning is not a homogenous concept and can be viewed either as a component of VET or the workplace as a learning environment where learning is understood to be a process inherent in an organisation's production structures and learning involves participation in communities of practice. Learning in the workplace is therefore a function in work activity and takes place in individuals, teams, organisations and communities and draws from functionalist, contextual, socio-historical and anthropological theories. The focus need not be either VET work experience or organisational workplace learning, but rather the learning strategies and practices necessary for acquiring and developing needed skills and competencies for organisational performance. The underpinning learning theories for workplace learning are therefore behaviourism and cognitivism but also draw on functionalist and contextual theories which emphasise situatedness and interaction (Cullen *et al.*, 2002).

According to Smith (2006), workplace learning is situated in constructivist epistemology and workplaces are sites of goal-oriented activities where learning arises from the demands these activities make on their participants. Learning in the workplace takes place in the encounter between the learning environment of the workplace and the employee's learning processes (Illeris, 2004). The workplace learning environment comprises the communities at the workplace and the technical-organisational system (Illeris, 2004). When individuals engage in everyday thinking and acting more than merely executing a process or task, their knowledge is changed in some way (Billet, 2004).

Most of an individual's learning is done outside of what are usually described as structured learning environments (Davis and Hase, 2001; Vaughan 2008). Eraut (2004) found from studies that most workplace learning occurs on the job rather than off the job. Working life for most individuals spans more than double the length of time spent in schooling. Since lifelong learning is a requirement for performance in knowledge-based societies, a large proportion of learning is expected to take place during working life and much of that in the workplace. Businesses can organise and direct workplace learning content and processes, align them to business strategy and benefit from them. A strategy of businesses therefore should be to develop a high-performance workplace with skilled and motivated workers who are empowered to work in autonomous or semi-autonomous teams (Tamkin, 2004). Workplace learning therefore becomes a tool through which businesses may gain competitive advantage by developing innovative practices and producing new knowledge (Vaughan, 2008).

2.4.2 Approaches to Workplace Learning

Fuller *et al.* (2007) argue that the production systems in a contemporary workplace give rise to many different forms of knowledge creation and use, and as a consequence to different forms of learning and pedagogical approaches. The knowledge and learning acquired by a worker in this environment are dependent on how broadly they participate and engage with the production process. Studies have shown that learning is enhanced when the following occur: the learner has access to experience with a wide range of work processes; the learner works alongside a colleague; the learner works in groups of people who have different kinds and levels of expertise, with each group member understanding the nature of that expertise and making better use of it in their own roles; the learner is allocated work that is progressively more difficult and challenging; and the learner gets opportunities for meeting and observing and working alongside those with more expertise (Vaughan, 2008).

De Vries and Lukosch (2009) argue that companies overinvest in formal training programmes while missing out on the opportunity to foster the more natural and informal learning processes provided by the workplace environment. They introduce the microtraining method developed on the basis of constructivism and connectivism learning theories to support informal, individual and collective learning in organisations. It uses 15-20 minute sessions structured to answer a question raised by a learner, involving demonstration, exercise, feedback and discussion.

Workplace learning can focus on the individual or on building communities of practice though an ideal approach would be to combine both through an on-going refinement and extension of theories concerning adult learning, action learning and learning

organisations (Vaughan, 2008). For instance, Davis and Hase (2001) present an action research project aimed at developing an effective learning environment within a mining and construction organisation, describing its major features as self-determined learning and self-managing work teams and emphasising the critical importance of the learner rather than the teacher in all aspects of the learning process. Learning organisations are discussed in Section 3.2.3.2.

Cullen (2002) and Vaughan (2008) outline the following possible approaches to workplace learning: off-the-job training where learning is related to specific problem-solving and task centred activities linked to the organisation's business strategy; forms of structured learning in the workplace, managed and validated by external providers; informal pervasive learning which forms the foundation of context based work practices, routines and behaviours; and intentional, structured and organised learning on the job with an explicit pedagogic strategy. An explicit workplace pedagogic strategy therefore comprises:

- Structuring of learning into workplace activities
- Participative modes of action-reflection
- Social learning and mutual construction of knowledge and critical awareness of worker roles

As with learning in most contexts, learner variables such as age, literacy and numeracy levels, previous knowledge, characteristics of the social groups they belong to, past experience, learning dispositions, learning motivation, and learning styles need to be taken into account in designing learning experiences (Dunn *et al*., 2001; Lucas *et al.*, 2012; Vaughan, 2008). Hodkinson *et al.* (2004) argue that the relationship between individual worker-learners and workplace and organisational practices and cultures are

complex and significant and identifies four overlapping individual dimensions to workplace learning, namely, workers' prior knowledge understanding and skills which contributes to their learning; cultural characteristics of social groupings of workers which influences the way they co-construct knowledge and take advantage of learning opportunities; learner dispositions which contribute to the co-production of workplace culture; and belonging to a workforce community which contributes to the development of worker identity. Studies have shown that workplace learning is as much about learning for attitudes as well as for skills (Vaughan, 2008).

Individual performance is underpinned by a diversity of human attributes. These include knowledge, skills, attitudes, drives, motivations, emotions, abilities, capabilities and much more. Each of these human attributes can be learned, they can be developed and they can be strengthened by learning. The role of learning, education, training and development is therefore to understand the human attributes that underpin performance and to devise and implement strategies for bringing about and enhancing learning (Hager, 2004). Illeris (2007, pp. 3) defines learning as "…any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing". Education, training and development are all currently viewed as subsets of "learning" which is a lifelong experience; with cognitive, emotional and social dimensions; and can take place within formal, non-formal and informal environments (Hager, 2004; Illeris, 2002; Jarvis *et al.*, 2003; Kolb, 1984).

2.4.3 Challenges to Workplace Learning

Studies such as Denton (1998) and Evans *et al.* (2006) suggest that there are significant organisational and cultural barriers to the promotion of individual and organisational

learning and these include: cost-based competition, a heavy reliance on economies of scale; low trust relationships; hierarchical management structures; people-management systems that emphasise command, control and surveillance. Others are: an underlying belief that people are a cost or a disposable factor of production (despite the human capital rhetoric); little slack or space for creativity and a culture of blame where mistakes (particularly those of lower cadre workers) are punished (Denton, 1998; Evans, *et al.*, 2006).

Harrison (2009) recognises the workplace as a problematic terrain given its contested evidence base and the practical tensions that can exist when stakeholder goals, power and values are highly divergent. Furthermore, Ley *et al.* (2008) note that knowledge work operates in a constant tension between personal goals and organisational constraints. Spencer (2002) suggests that there is a tension between work and learning and advices caution on continuous enthusiasm about lifelong learning. Focus should be on workplace democracy otherwise, different interests and different interpretations of workplace learning may collide (Spencer, 2002) and contradictory outcomes may be the result as reported from studies by Bratton (1999). The concern is that boundaries between jobs which have been the basis for job classification, pay rates, training entitlements and other forms of benefits for workers can be partially dismantled by workplace learning practices such as job rotation through teamwork. In addition, cross-training, multitasking and other forms of technical skills development initiatives that increase flexibility may deliver short term benefits to employers in terms of labour costs but may also result in job losses for the collective of workers (Bratton, 2001; Vaughan, 2008).

Other concerns are that developing communication skills and problem-solving skills in the workforce enable teams to overcome any resistance to embracing the goals and terms of work of the employer, resulting in the interest of the employer (production targets) being put ahead of the individual or collective interests of the workers (improved working conditions) (Vaughan 2008 citing Jackson *et al.*, 2000). Bratton (2001) reports on a study suggesting that the shift to workplace learning and lean production was linked to a tendency of exploitation of workers by employers.

2.4.4 Workplace Learning Best Practice Principles

Ley, *et al.* (2008) argue that in order to enhance productivity, competency enhancement and learning have to take place directly at work places. Harrison (2009) discusses the potential value of the workplace as an integrated domain of work and learning both for the novice learner and the established communities of practice. Workplace learning specifies an integrative view of working environment by connecting learning, work and knowledge spaces (Ley *et al.,* 2008). With respect to workplace learning pedagogy, Cullen (2002) notes that there is no specific checklist of things to do rather there are things to consider. Vaughan (2008) recognises the complexity of learning and argues that because learning is more than the sum of its parts, it cannot be reduced to its "ingredients" as in a recipe. Relationships and interactions between factors and aspects of good practice need to be given consideration instead in the complex area of workplace learning (Vaughan, 2008). Features of good workplace learning practice have been synthesised from literature and are included in ANNEX 1.3 with appropriate references.

Traditionally, training programmes in organisations tend to be formal and standardised to achieve clearly defined goals, yet the concepts of a knowledge based economy and a learning organisation derive from a recognition of the complexity and uncertainties of a rapidly changing world, thereby calling for a paradigm shift in learning processes (Eraut, 2004, Siemens, 2004, Stevens, 2015). To be effective in rapidly changing environments, learning should build skills at the appropriate, just-in-time moment and this is supported by the notion that learning that is promptly applied is usually retained for maximum benefit (Marquardt, 2011).

Work-based learning can be stimulated in a number of ways. Vaughan (2008) suggests the use of a flexible range of pedagogical approaches in workplace learning. Annex 1.2, in Appendix I, outlines various methods synthesised from literature with key references that are appropriate for workplace learning.

2.5 Chapter Summary

Positivist approaches to learning theories rest on psychological investigations of learning focused on the individual as the unit of analysis. Workplace learning theories are based on the notion that learning is best effected when it takes place within the context in which it is to be applied (Cullen, 2002; Rauner, 2007; Vaughan, 2002). It can be argued therefore that construction sites provide a rich arena for the learning of construction skills experientially (Abdel-Wahab, 2012; Harris, *et al.,* 2001; Mulcahy, 2000; Wang *et al.,* 2010;). These perspectives have also highlighted the importance and influence of context in the learning process.

This research takes the view that skills are features of the workplace as a social system rather than just features of individuals or jobs (Stasz *et al.*, 1996). Learning and performance on the job are integrated within a workplace context and are therefore better studied holistically as parts of a complex social system. This research therefore focuses on two units of analysis: the individual worker and the construction organisation context in this research.

Individual learning has been the focus of this chapter of the work. Individual attributes required for effective learning and expert performance have been synthesised from literature. These were based on contemporary learning theory (Boyatzis and Ratti, 2009; Illeris, 2007). Contemporary learning theories integrate, cognitivism, constructivism and humanism learning paradigms, and recognise that performance in this Knowledge Age is dependent not just on acquiring static knowledge and skills but also on the wider abilities for continuous learning in context. These theories also integrate emotional competencies such as motivation, creativity, individuality and self-control that provide the mental energy to learn, and social competencies that equip the individual to interact successfully with people and the material, societal and media transmitted worlds (Boyatzis and Ratti, 2009; Goleman, 1998; Illeris, 2002; Jarvis, 2009). The whole person attributes needed for effective human learning and performance were identified through this review and will be investigated further within the ambit of this research. These attributes are outlined in Annex 1.1 of the Appendices to this thesis.

This chapter also explored learning in the workplace from the perspective of the individual worker learner. Chapter 3 reviews the links between learning and performance at work, the human resource aspects of business strategy and the integration of learning with work from the perspective of the construction business.

CHAPTER 3 THE CONSTRUCTION BUSINESS AND WORKFORCE DEVELOPMENT

3.1 Introduction

Transition of economies from the Industrial Age of the 20th century through the Information Age of the late 20th century and to the Knowledge Age of the 21st century is well documented (Vaughan, 2008). Ofori (2003) described it as an economic revolution that requires businesses and governments to constantly adapt to change. Dankbar (1999) noted that industry was changing rapidly and both the internal and external organisation of businesses are affected. Developing high performing workforces and continuous learning are critical success factors for businesses to succeed in knowledge based economies (Ofori, 2003).

The constructivist approach views learning as context and content dependent (Boghossian, 2006). Social constructivism emphasises the critical importance of interaction with people (Hung, 2001) and therefore reflects the complexity of the domains of the learning environment and everyone in the environment (Bush, 2006). Understanding an environment is therefore integral to understanding the requirements for learning and development in that environment. The changing nature of work, knowledge and required skill sets drives the learning process for that domain (Vaughan, 2008).

Human capability building is a very broad concept and can be managed in multiple ways (Nafukho, 2013) with contributions at institutional, organisational, project, team/crew/work group and individual levels. The ILO (2010) reports that developing a

skilled workforce for strong, sustainable and balanced growth is understood in broad terms to cover the full sequence of life stages: basic education which provides the foundation for individual development; initial training to provide the individual with core work skills, knowledge and industry based professional competencies; and continuous workplace and life-long learning to maintain individuals' skills and competencies as work, technology and skill requirements change.

This chapter examines WLD within the context of AEC organisations. It specifically examines the role of learning and development of workers in improving performance (individual and organisational) and ultimately in achieving business goals. It also explores the multiplicity of ways in which WLD can be achieved within organisations and the potential for incorporating HR best practices into construction business models.

3.2 Learning and Performance

3.2.1 Links between Individual and Organisational Performance

According to Kumaraswamy (1997), apart from external factors, organisational performance as a whole or on a particular project is dependent on the performance of each individual worker and each manager. The competencies of a firm are made up of a network of the skills held by individuals in the firm. These views are supported by Klein *et al*., (1998) who see the competence of an organisation as a network of the related skills held by the firm. It has been argued that the innovation and competitiveness of organisations seem to depend to a degree on the skills and competence of the workforce (Vaughan, 2008). In construction, it has been found that low skill levels result in low productivity; poor work quality; and high levels of waste in terms of material cost and

time. The corollary is that organisational performance of construction firms will also be low (Olatunji *et al*., 2000; Awe *et al*., 2009).

Cheng *et al*. (2007) found that task performance contributes significantly to project outcomes and conclude that construction firms must ensure that employees are equipped with such attributes as responsibility, quality of work ability, job knowledge, experience, efficiency, accuracy, judgement and initiative. Tabassi *et al*. (2011) see HR as an organisation's most important asset and firms need to develop capacities for learning faster than competitors; for finding solutions to novel and complex problems; and for improving productivity through effective training and development practices. Wang *et al*. (2010) conclude from cost-benefit studies that craft training is indeed profitable to a project's bottom line in terms of a project being both profitable to the contractor and being completed on schedule.

According to Abdel-Wahab *et al*. (2008), there is little evidence that investments in training will improve company performance or productivity despite the theoretical and intuitive appeal of investing in training and skill development. They assert that the studies that have shown a positive linkage between training and corporate performance have a potential for bias in the findings as a result of the methodology used. They also discuss other research that show where increasing training hours have reduced productivity and training costs outweighed the benefits of training. They note that although associations have been found between HRM practices (including training) and performance, none of those studies have established causation. They did, however, find that the linkage between training by firms and corporate performance was not simple but rather a complex one in the sense that training may not be a remedy for

performance but may be a viable solution if the focus and content of training aligns with the business strategy of the organisation; if there is a clear need for the training; and if the benefits of training outweigh the costs. Construction firms need to understand how skills contribute to the organisation's performance and align skills training into business strategy for achieving organisational goals (Goulding and Alshawi, 2002).

3.2.2 The Location for Construction Skills Learning

Most vocational education and training (VET) systems advocate a dual VET model comprising theoretical learning at a training institution and practical on-the job-training in the workplace (Mummenthey and du Preen, 2010). Literature, studies and experiences lean towards one or the other in varying degrees (Rauner, 2007). Rauner (2007) presents the results of studies on the competence levels achieved from three variants of the dual apprenticeship scheme. Apprentices who spend two-thirds of their three-year apprenticeship course in work-based learning and the remaining third of the course in school based-learning achieved work ready levels of competence at the end of the course. Apprentices who spent most of their time in training centres do not achieve work ready competence at the end of the course but require at least six more months of work-based experience to achieve work ready competence. For apprentices with school-based education and training in classrooms and workshops, formation of work ready competence is delayed considerably (Rauner, 2007).

Harris *et al*. (2001) found that the work-based learning environments and school-based learning environments make valuable but different contributions to skills learning and concluded that both were needed for effective learning. Institutional learning focused on knowledge 'that' while workplace learning focused on the 'how'. A review by Schaap

et al. (2012) agrees with these categorisations and conclude that both environments were valuable in learning but also highlighted the limitations of each. Specifically, they argue that the trend towards greater emphasis on workplace training had the potential of the development of narrow skills, serving immediate requirements of individual worksites at the possible expense of long-term industry needs, and ignoring the career needs of the individual learners. They suggest that workplace learning potentially results in 'just-in-time learning' at the expense of 'just-in-case learning' which is acquired in institutions and retained for future application. They suggest that if the worksite is going to be increasingly relied on as a learning environment, it is vital that the quality of workplace learning be further facilitated.

Harris *et al.* (2001) comment on the training reforms in the VET sector in Australia which have been "accompanied by a dramatic rise in the perceived value of the workplace as an authentic site for learning" with vocational learning gradually becoming "de-institutionalised". This trend, they argue, agrees with modern learning theories that view learning no longer as a "product" but rather as a process which is promoted by experiential, problem-based and project-based learning. They suggest that the challenge would be to develop fundamentally new pedagogies that are better matched to the demands of the workplace context of learning, to establish new learning networks that fit in with regular work patterns without disrupting the natural flow of work, and to organise learning experiences that allow learners to develop their own knowledge and understandings.

3.2.3 Managing Learning in Construction Organisations

Some form of learning takes place within construction organisations (as with every other workplace), whether ad hoc, informal or formalised, and this learning affects corporate performance either positively or negatively depending on the learning content and the focus of what is being learned (Eraut, 2004). Construction firms have the option of directing the learning in their workspaces in terms of content and the expected learning outcomes, aligning learning experiences with business strategy to meet organisational goals (Cullen *et al.,* 2002; Vaughan, 2008), and ensuring that learning is achieved efficiently and effectively (Manuti *et al.,* 2015; Kerka, 1997; Eraut, 2004). This section describes some formal approaches to managing learning within organisations including construction firms.

3.2.3.1 Organisational Learning

Organisational learning is about creating, storing and transferring knowledge within an organisation. These relate to the four constructs typically linked with organisational learning: knowledge acquisition; information distribution; information interpretation; and organisation memory (Huber, 1991). Argyris (1997) opines that organisations learn through individuals acting as agents for them. Similarly, an organisation learns when any of its units acquires knowledge that is useful to the organisation (Huber, 1991). Furthermore, the entity learns when its "range of potential behaviours" is changed as a result of the entity's information processing systems (Argyris, 1977). The cognitive aspects of learning also typically linked with organisational learning are single loop learning, where a worker absorbs knowledge passively, and double loop learning, where the worker actively questions the validity of the knowledge received (Argyris, 1977; Dainty and Chan, 2011; Huber, 1991). With organisational learning, learning by

individuals is stored in the organisational memory in the form of routines, rules, procedures and culture; the learning entities are both the individuals and the organisation and the knowledge exists outside single individuals (Love, *et al.,* 2000; Ortenblad, 2001). The following section describes learning organisations as distinct from organisational learning.

3.2.3.2 Learning Organisations

Senge (1990) defined the learning organisation as the organisation "in which you cannot *not* learn because learning is so insinuated into the fabric of life"; also as "a group of people continually enhancing their capacity to create what they want to create." Five technologies for achieving this state were suggested as being: system thinking; personal mastery; mental models; shared vision; and team learning (Senge, 1990). Garvin (1993) found these definitions deficient in the sense that they didn't include decisive policies and practices that would ensure success. These, Garvin (1993) described as the building blocks of learning organisations and went on to outline five main activities that learning organisations need to be skilled at and these are: systematic problem solving; experimentation with new ideas; learning from experience; learning from the best practices of others, and diffusing knowledge throughout the organization (Garvin, 1993).

In learning organisations, the individuals are the learning entities, knowledge is mostly stored in the individual but to some extent outside of the individual (Love, *et al.,* 2000; Ortenblad, 2001). Learning organisations are a type of organisation, while organisational learning describes how learning takes place in an organisation. Organisational learning happens in every organisation, but not all organisations are learning organisations (Love, *et al.,* 2000; Ortenblad, 2001; Styhre, *et al.,* 2004). These distinctions notwithstanding,

the terms organisational learning and learning organisation are sometimes used interchangeably in literature and more often in construction management literature (Chan, *et al.,* 2005; Dainty and Chan, 2011; Kululanga *et al.,* 2001)

3.2.3.3 Continuous Improvement

An underlying concept of most organisational development and organisational change initiatives is the notion of improvement and innovation. These are typically classified into continuous and breakthrough improvement. Breakthrough improvement or innovation would require radical changes in the organisation. Continuous improvement on the other hand is an ongoing effort to improve knowledge, skills, processes, services and products (Duffy, 2014). Continuous Improvement is a management approach that typically uses Deming (2000)'s Plan – Do – Check – Act (PDCA) Cycle (Duffy, 2014). The Institute of Quality Assurance (IQA) (now the Chartered Institute of Quality) defined continuous improvement as a gradual never-ending change focused on increasing the effectiveness and/or the efficiency of an organisation in fulfilling its goals. Put simply, it means, "getting better all the time" (Fryer *et al.,* 2007). The change process is organisation-wide, systematic, and incudes the participation of all employees (Fryer*, et al.,* 2007). Continuous improvement is based on the simple philosophy that "we can be better than we are" and where all the members of an organisation work together continually to improve, overall performance is expected to improve continuously. The purpose of continuous improvement is to improve value for money, achieve more efficient use of resources and gain competitive advantage (Fryer *et al.,* 2007).

Continuous improvement has gained traction in the construction industry in the past two decades. Constructing Excellence (2006) noted that being forward looking and

receptive to new ideas were essential elements of continuous improvement suggesting that successful organisations in the prevailing highly competitive markets needed to be open to change. Constructing Excellence (2006) outlined eight essential factors for continuous improvement within construction organisations and these are: total commitment from senior management; contribution from all employees; employees understanding of their role in achieving business strategy; performance management at employee and organisational levels; good communication; development and training of employees; signing up to recognised quality management systems; and measuring and evaluating progress against key indicators and benchmarks. Similarly, Fryer *et al.,* (2007) identified from studies, commitment from senior management, communication, training and learning, quality culture, customer management and quality data as critical success factors for continuous improvement. Smythe (2010) evaluated the UK Continuous Improvement Programme involving 525 demonstration projects and found that although improvement was evident, it was not continuous and was not transferable and therefore recommended that construction organisations develop learning and competence capacity and to reinforce forms of communication, explicit and tacit.

Learning is inexorably linked to improvement in quality management literature (Garvin, 1993; Hill, 1996). The link between learning and continuous improvement in the construction industry is also emphasised by Smythe (2010). To remain competitive in dynamic business environments therefore, construction organisations must be able to learn and to sustain continuous improvement (Javernick-Will and Hartmann, 2011).

3.3 Organisations and Human Capital

3.3.1 Business Strategy

Strategy constitutes the logic underlying an organisation's interactions with its environment which guides its deployment of resources (Junnonen, 1998). Price (2003) cites Johnson and Scholes (1997) definition of strategy as "The *direction* and *scope* of an organisation over the long term which achieves *competitive advantage* for the organisation through its configuration or *resources* within a *changing environment* to meet the needs of *market* and to fulfil *shareholder expectations*". This definition was found to be the most appropriate by the construction organisations studied by Price (2003) because it included key words and phrases.

The construction firm like most businesses exists for a purpose and the firm typically defines and pursues strategies to achieve the business purpose or goal. The purpose of strategy is either to make a business fit into its environment or to use the resources of the business to reshape the environment. By achieving either of these, the probability that the organisation will survive and prosper is enhanced (Campbell *et al.*, 2011). Businesses are usually concerned with providing goods and services, seeking profitability, and seeking competitive advantage over rivals. The three main competitive strategies that organisations can adopt are cost leadership, differentiation, and focus. Differing perspectives of strategy have evolved centring generally on one's view of the capacities and motives of individuals and organisations. Strategy, however, needs to be dynamic and no single school of thought should dominate in all situations (Cheah *et al.*, 2004 citing Whittington, 2001).

The positioning school of strategy is founded on positioning an organisation in the best place in the market or industry 'space' based on the structure – conduct – performance paradigm (Campbell, 2011). Here, the nature of the environment and the market influence the competitive strategy adopted by organisations. For instance, when construction clients favoured the lowest cost paradigm in construction procurement, construction organisations adopted cost leadership strategies, when clients progressed to best value/and or partnering criteria, construction organisations adopted differentiation strategies; and with the current integration of supply chains in the construction industry, construction firms are adopting focus strategies (Price, 2003).

The resource based view (RBV) or the value school of strategy views performance as resulting from the best use of the broad range of resources available to an organisation and thereby achieving competitive advantage (Campbell *et al.,* 2011). An organisation's resources fall into four categories: financial resources; HR; physical resources; and intellectual resources (Campbell *et al.,* 2011). The resources or assets provide not just industry threshold competencies but core competencies differentiating the organisation and making competitive advantage potentially more sustainable particularly if the advantage is embedded in the intangible resources which are difficult to imitate such as skills, expertise, experience, knowledge, networks and processes that the workers possess; and patents, brands and organisational routines which the organisation possesses. Emphasis is therefore on innovation, creativity, value chain, knowledge and talent (Haan *et al.*, 2002; Campbell *et al.*, 2011)

Cheah *et al.* (2004) present a conceptual model which divides corporate strategy into seven strategic fields, each a separate, major component within corporate strategy and

each of which has evolved into disciplines requiring separate planning and execution comprising, Business, Operational, IT, Marketing, Technology, Human Resource and Financial strategic fields. Conflicts among individual strategic fields present a challenge for integrating into a coherent corporate strategy, however, Cheah *et al.* (2004) posit that strategic actions that are derived from the interactions between two or more strategic fields are more powerful in shaping a sustainable and successful corporate strategy than those based on only a single field. Cheah *et al.* (2004) therefore suggest that strategic fields and internal and external mechanisms be treated as variables that can interact in numerous ways leading to higher order differentiation for construction organisations.

Seaden *et al.* (2003) link the business strategy variables of marketing, HRM and the business environment variables to innovation in construction organisations. Haan *et al.* (2002) identify innovation as one of three core capabilities on which an organisation's superior performance is based. The other two variables identified are marketing management and production. The role of learning in innovation is emphasised and they argue that an organisation creates ownership-specific asset advantages by learning through cross-functional collaboration. The significance and importance of HR to organisational performance and the achievement of competitive advantage by organisations was not always recognised. The next sections trace the emergence of human capital theory (HCT) and its impact on the people management functions in organisations.

3.3.2 Human Capital Theory

Nafukho *et al.* (2004) present a chronological review of the definitions of human capital theory commencing from its formal origins in the 1960s in America and the work of Schultz (1961a) and Becker (1993). The knowledge and skills that people acquired through education and training was conceptualised as a form of capital, this capital being a product of deliberate investment that yields returns (Schultz, 1961b). Returns may accrue to the individual as additional income and to the general society as increased productivity provided by the educated (Becker, 1993). More recently, human capital has been described as the collection of acquired human capabilities that are durable traits yielding some positive benefits by enhancing performance in socially valuable activities (David and Lopez, 2001). Initially, human capital theory found application in households and the nation as an economic whole only, but this changed with the advent of the resource based view of firms in the 1980s. Up until then, the theory of production applied to firms. The firm's main function was the production function which sought to maximise profit by turning inputs (raw materials, labour and fixed capital goods) into outputs. Success of the business was determined by its ability to minimise short term costs and maximise both short and long term profits (Duffy, 2015). With the resource based view, a firm became the sum of the strategic resources available to it (Duffy, 2015). Success of a firm was now dependent on the firm building a valuable set of resources and bundling them together in unique and dynamic ways (Stiles and Kulvisaechana, 2003).

Duffy (2015), however, observed that the processes, knowledge, technical expertise and other strategic resources vital to the survival of a firm are the product of its human capital. A company, therefore, needs to either make or buy it and retain and encourage

it thereafter. A firm's current and future success now hinges on the organisational processes that supply the knowledge and skills it needs to occupy and maintain a competitive position. Firms need to adjust to the fact that human capital is becoming more important than physical capital and therefore need to invest in on-the-job learning, performance based compensation packages, structuring and perpetuating an environment that supports free information flow and workplace learning (Duffy, 2015).

3.3.3 The Resource-based View of the Firm

Efforts to attain competitive advantage have gradually shifted away from external positioning towards a recognition that internal resources are key to sustained effectiveness (Wright *et al.*, 2001). The resource based view of firms owes its genesis to the work of Penrose (1959) who conceptualised the firm as 'an administrative organisation and a collection of productive resources' (Boxall, 1996). Penrose (1959) distinguished between physical and human resources and maintained that firms were heterogenous and there was money to be made from exploiting the differences. The premise of the resource-based school is that broadly similar resource combinations are required by a firm to simply survive and maintain parity in an industry, but that it is the unique resources that give the firm the competitive edge. Theorists such as Barney (1991) distinguish between competitive advantage that a firm presently enjoys but which other firms will be able to imitate and strategic competitive advantage which other firms cannot compete away. To maintain sustained advantage, resources must meet the criteria of value, rarity, imperfect imitability and non-substitutability.

Stiles and Kulvisaechana (2003) argue that natural resources, technology or economies of scale are increasingly easy to imitate but that human capital is not for at least two

reasons. It is difficult to grasp the precise mechanism by which the interplay of HR practices generates value and these HR practices are path dependent in the sense that they consist of policies developed over time and cannot be quickly purchased by competitors. The interdependency between HR practices combined with the idiosyncratic context of particular organisations creates barriers to imitation (Stiles and Kulvisaechana, 2003). Dankbaar (1999) notes that even though technological change remains an important issue, mastery of technical change and the implementation of new technologies requires flexible organisations and skilled and motivated personnel. Enterprises are now not so much differentiated by technology, but by the human resources that the enterprise has at its disposal and the manner in which these resources are utilised. These are reflections of the view that market value depends less on tangible resources but rather on intangible ones such as HR (Stiles and Kulvisaechana, 2003). The resource based view has strengthened the argument that people are the most important assets of businesses and effective people management systems are critical to business success. The success of Japanese businesses often attributed to their distinctive people management systems also support the notion. The knowledge-based view of the firm, an emerging model, also emphasises that organisations need to develop and increase the knowledge and learning capabilities of the employees through knowledge generation, acquisition, sharing and transfer to achieve competitive advantage (Stiles and Kulvisaechana, 2003).

3.3.4 Aligning Business Strategy to Learning

Cullen *et al.* (2002) note the emergence of work-based learning as a strategic tool and with the new production and technology configurations, businesses are increasingly regarding learning as a key instrument in achieving competitive advantage. The way an

organisation learns is becoming a key indicator of the way it innovates and remains profitable while knowledge building is becoming the key source of advantage in this post-industrial era. Consequently, concepts such as work-based learning, organisational learning and learning organisations have become prominent (Chan and Dainty, 2007; Chinowsky *et al.,* 2007).

Short and Harris (2010) describe alignment as the range of management processes based on planning and directing learning projects towards strategic goals. Achieving alignment is not straightforward mainly because of the difficulty in measuring the impact of learning interventions on corporate performance. They also report that workplace learning, employee development and training were the most highly ranked components of HRD. Despite this, Cullen *et al.* (2002) report that companies are increasingly linking training more explicitly to company goals and introducing pedagogic practices aimed at relating learning assignments to problem-solving, task-centred activities and other targets as specified in business plans.

3.3.5 Human Capital Links to Performance

Studies are beginning to demonstrate that workplace and employment relations practices are positive contributors to economic development rather than a constraint on the ability of firms to grow (Stiles and Kulvisaechana, 2003; Vaughan, 2008). At individual levels, better learning, education and training lead to improved skills and these can command better wages. At organisational levels, Stiles and Kulvisaechana (2003) analysed 14 separate studies to link HR practices to performance. Seven of the studies relied on single measures of HR practices while the other seven relied on a range of HR practices. The analysis provided empirical support for the notion that single HR

practices may not reveal an accurate picture. The dominant view of HR efficacy was that relying on single measures of HR practices with which to predict performance is unlikely to be very revealing, suggesting that integrating a bundle of HR would produce better results (Stiles and Kulvisaechana, 2003).

Barney (1995) discusses the question of organising a firm's resources and capabilities in order to exploit their full potential for competitive advantage and concludes that the resources and capabilities are complementary because they have limited ability to generate competitive advantage in isolation. However, in combination with other resources and capabilities, they are expected to enable a firm to realise its full competitive advantage. A number of case studies were presented by Barney (1995) in support of this notion.

Although HR practices have been positively linked to improved performance, direct causation has not been established, because rival explanations can be given for the correlation between HR practices and performance. For instance, Stiles and Kulvisaechana (2003) discuss three possible rival explanations: reverse causation; firm specific contexts and contingencies surrounding the organisation make HR alignment complex and idiosyncratic thereby rendering generalisations problematic; and some firms still succeed without adopting human capital optimising 'best practices'. Further investigations in this area were suggested.

In summary, HR practices have been positively associated with performance. Also, combinations of a wide range of HR practices would yield better results (Stiles and Kulvisaechana, 2003). For instance, practices that enhance worker commitment such as

autonomy, training, monetary compensation, employee participation are associated with high performance levels (Huselid, 1995; MacDuffie, 1995; Stiles and Kulvisaechana, 2003). The question would be which HR practices should be included in the bundle for best results and how should they be organised to ensure best fit. The next section discusses three approaches to achieving best fit.

3.3.6 Approaches to Selecting HR Practices for Performance

Stiles and Kulvisaechana (2003) outlines three pertinent approaches namely:

3.3.6.1 Contingency or 'fit' approaches

The organisational strategy of the firm influences the style and approach of HR activity because a central tenet of strategic human resource management (HRM) is that HR practices and processes need to align vertically with the organisational strategy of the firm (Stiles and Kulvisaechana, 2003; Wright and McMahan, 1992). The emphasis is on alignment or 'fit' between the external environment, the organisational strategy and HR practices. Huselid (1995) reports that many successful organisations aligned their HR practices with strategy and improved their performance outcomes (Delery and Doty, 1996; Youndt *et al.,* 1996). MacDuffie, (1995) obtained contradictory results.

3.3.6.2 Universal or 'best practice' approach

The universal or best practice approach also known as the high-performance work practices approach emphasises the need for consistency among HR practices (internal fit) in order to achieve effective performance. This approach has received a high degree of empirical support (Huselid, 1995; MacDuffie, 1995; Stiles and Kulvisaechana, 2003). For instance, Stiles and Kulvisaechana (2003) report that enhancing worker

commitment (autonomy, training, monetary compensation, employee participation) are associated with higher performance while HR practices aimed at reducing employee skill and discretion are associated with increased turnover, and poor manufacturing performance. Investments in HR activities point to the fact that incentive compensation, selective staffing techniques and employee participation impact on employee skill development and motivation and consequently result in lower turnover, improved productivity and increased organisational performance (Huselid, 1995; Stiles and Kulvisaechana, 2003). The results from these studies suggested that the more the high performance HR practices used, the better the performance in terms of productivity, turnover and financial soundness. The studies, however, vary in what constitutes best practice, but most focus on HR activities that improve the skill base of workers, and practices that promote empowerment, participative problem solving, teamwork and group based incentives (Stiles and Kulvisaechana, 2003).

3.3.6.3 Configurations approach

This approach emphasises the patterns or configurations of HR practices that predict superior performance when used in association with each other or the correct strategy or both (Stiles and Kulvisaechana, 2003). In effect, the organisation develops a HR system that achieves both horizontal and vertical fit. MacDuffie (1995) identifies two principles critical to configuring this bundle of practices: the practices are interrelated and internally consistent; and more is better with respect to impact on performance because of the overlapping and mutually reinforcing effect of multiple practices. The approach rests on the concept that there is an effective combination of best practices suited to different organisational strategies (Stiles and Kulvisaechana, 2003). Theorists, such as, Huselid and Becker (1995) and (Delery and Doty, 1996) are proponents of the

configurational approach. The distinction between best practice and contingency approaches blurs in the configuration approach (Becker and Gerhart, 1996). Furthermore, with this approach, best practice relates more to the principles underlying the choice of practices rather than the practices themselves (Guest, et al., 2000).

The next section examines the different terminologies relating to WfD, their origins and current usage. The purpose of this segment of the discussion is not to provide justification for selecting one of the labels as appropriate for this research, but rather to provide justification for focusing on the functions and activities covered by the various terminologies rather than the labels themselves.

3.4 Learning and Development, Human Resource Development or Workforce Development

The learning and development activity in organisations is termed "human resource development" mostly by the academic world (Harrison, 2009; Stewart, *et al*., 2013). Practitioners tend to find the reference to people as "resource" somewhat demeaning (Harrison, 2009). The traditional term "Training" is currently seen as simply one route to achieving development and has therefore dropped in prominence in contemporary organisations and in publications. Harrison (2009) traces the genesis of learning and development activity in organisations to the USA in the 1970s where it was first described as "human resource development" and where it was limited to short term training for the purposes of acquisition of skills and behavioural change. By the 1990s, HRD had developed into a recognisable profession which had less to do with training and more to do with a generalised task to plan and direct individual and organisation renewal. In the UK, terminology ranged from "training" to "training and development"

to “employee development” until “learning and development” was settled on after extensive consultations by the Chartered Institute of Personnel and Development (CIPD) (Harrison, 2009).

“Human Resource Development”, however, remains popular although it still has no universally accepted definition. It is generally seen as an organisational process of developing people: involving the integration of learning and development processes, operations and relationships (CIPD, 2005); and to aid collective progress through collaborative expert and ethical stimulation and facilitation of learning and knowledge that support business goals (Harrison, 2009). For Stewart *et al*. (2013), HRD is a human construct and does not have a settled or accepted meaning. Some of the origins of HRD (debated) can be traced to organisational development (OD). Dainty and Chan (2011) argue that a precise definition of HRD would be problematic and possibly counterproductive because it would narrow down a broad set of interrelated activities which inevitably change in response to dynamic environmental influences. They suggest that rather than attempting to define HRD as a homogeneous activity, it is best understood as a label for a range of interrelated concepts and activities through which people are developed within organisations. This broad set of activities encompass structured and unstructured learning and performance based activities which develop individual and organisational competence, capability and capacity to cope with and successfully manage change (Simmonds and Pedersen, 2006). Dainty and Chan (2011) therefore see HRD as a key HRM activity, the most crucial in ensuring the responsiveness and agility of the contemporary construction firm.

Another such label is “workforce development” (WfD) which also has as many definitions as there are perspectives (individual, organisation, industry, national or regional). A World Bank (2011) report notes that WfD has become a topic of growing interest reflecting the concern among diverse researchers and policy makers about the implications for skills development springing from five major factors: globalisation, the role of knowledge and innovation in the “new economy”, technology, political change and demographic changes. Jacobs and Hawley (2009) argue that a new definition is required based on simultaneous consideration of learning and development for work at individual, organisation and societal levels. To explain the reason why this one label is used to describe such a wide range of activities, Jacobs and Hawley (2009) suggest that WfD represents the growing awareness of the connectedness of these systems; the success of development initiatives at one level is dependent on connections to initiatives at other levels that would have been considered in isolation from each other.

Jacobs (2000) compared and contrasted HRD and WfD and found that their goals were complementary because in a broad sense both fields emphasise enhancement of human competence in order to achieve performance outcomes of value. The implication being that both fields are rooted in human capital theory and both fields focus on helping individuals achieve their goals as a component of achieving macro goals. The difference between the two can be found in considering their context of the outcomes of value. Jacobs (2000) suggests that HRD setting is the organisation and the individuals in the organisation, and the goal is to enhance organisational effectiveness. According to Jacobs (2000) WfD encompasses the broader context of schools, government programmes and community agencies, operational focus is all adults in employment or not in employment, and wider societal issues as wages, productivity and other indicators

of national prosperity. Jacobs (2000), however, notes the calls for HRD to re-examine its philosophical understandings and consider how to respond to new societal requirements.

As a result, HRD literature indicate that HRD has expanded beyond the organisation to include national HRD and international HRD (Harrison, 2009). Similarly, Chan and Marchington (2012) argue that the purpose of HRD should be much broader than the narrow margins of the human capital perspective and that benefits should accrue to the individual workers, employers and society at large. In summary, it has been suggested that over time the distinctions between the various labels have blurred. The next section identifies from literature a broad range of WLD practices within organisations associated with individual and organisational performance optimisation.

3.5 Workforce Learning and Development Mechanisms

Sambartolo (2015) has observed that optimising workforce resources has become more complex, particularly for large enterprises and enterprises that operate in multiple locations. This is often the case for construction organisations. HR managers and line managers are therefore required to be strategic and more responsive, shifting from a reactionary stance to being proactive to workforce management issues. Organisations need to move away from the traditional cycle of needs assessments and immediate supply processes to see the value in more holistic, multidimensional and longer term solutions (Kelly and Palmucci, 2014). Bowes (2008) posits that recruitment alone cannot solve the problem of skills shortages or mismatches and that though WfD may be a lengthier project, it is more rewarding as it creates labour force stability, employee

loyalty and long term retention. A comprehensive workforce management strategy is therefore essential.

3.5.1 Strategic Workforce Planning

Organisations need to plan strategically for WfD to meet current and future requirements, taking a long-term view and planning to the granular level of skill clusters (WEF, 2016). Workforce planning refers to the strategic process of forecasting the talent needs of the business and creating plans that will ensure high performance. Strategic workforce planning involves determining talent implications, identifying segmented roles, and defining the build or buy actions to be taken (Blackburn *et al.,* 2013*;* Cooper and Wood, 2012*;* DeTuncq and Schmidt, 2013). According to Bowes (2008), organisations need to understand their skills requirements by conducting job analysis of all workforce competencies to identify the skills required for each critical area, conduct a needs assessment to determine gaps, and prioritise skill development needs for short-long term gains. At another level, this would also involve determining skill commonalities between jobs and preparing employees to be able to learn new skills and talents while at the same time improving productivity, and providing the organisation with overall employment flexibility (DeTuncq and Schmidt, 2013).

A strategic WfD plan needs to address work related issues as well as fulfil the need to build internal capacity (Cunningham and Hillier, 2013). Once strategies are set and plans agreed, organisations need to monitor and control to note deviations and plan to reduce the effect on performance (Sambartolo, 2015). Complete visibility across all employees and locations achieved through a comprehensive workforce management strategy backed by technologies that deliver labour data in real-time (Sambartolo, 2015).

3.5.2 Workforce Development Practice

WfD practice begins with talent acquisition which involves attracting, selecting and acquiring the right talent that the business needs to accomplish its strategic goals (DeTuncq and Schmidt, 2013). The ability to retain an organisation's talent is also important for sustaining a competent workforce (Sambartolo, 2015). Effective use of workforce is also key to improving organisational performance. This involves a complex matrix of weighted variables such as individual factors (experience, skills, knowledge, attitudes), team compositions, job-pairings, and labour/labour development costs (Sambartolo, 2015). Real time metrics provide data on who performed the work, how long it took and this enables job pairing which allows for low performers to be paired with high quality producers to enable the habits and practices of the best employees to influence others. Studying and measuring workforce practices is essential to improving effectiveness and automating workforce management tasks is essential to achieving strategy (Sambartolo, 2015).

Van Riel (2008) outlined a set of soft initiatives for stimulating strategic alignment of workforce to business goals and these are: employee participation; themed messaging about corporate goals; increased cross-organisational communication; managed expectations regarding involvement in decision making; explicit attention for cross division dialogue; making information accessible for other business units; increased line of sight; stimulating feedback about people's contributions as a whole; people receiving recognition for their contribution to achieving organisation goals; people being sufficiently rewarded for their contribution to achieving company goals; capability development; providing employees with sufficient resources to pursue goals; providing

employees with sufficient training to pursue goals; and providing employees with sufficient authority to pursue goals.

Bowes (2008) notes that employees will commit to an employer when they see an opportunity for the future. Organisations, therefore, need to apply career promotion strategies providing career management programmes for all staff (Kyriakidou, et al., 2013). Employees, however, are expected to take personal responsibility for their own career the goals. Individual workers need to understand what they are good at, what they like to do, what motivates them, and what environments they best excel in. The organisation can then help them to match their personal goals to corporate goals This enables employees to see a future in the organisation. Opportunities for formal learning should be created, these being custom designed and developed to specifically address identified needs. A variety of methods and activities in-house and external should be employed while structuring learning such that participants progressively build their skills (Bowes, 2008).

Reward and recognise participants' success is a WfD practice that increases employee self-esteem, creates increased value for in house development programs, seek credit for local educational institutions, and partner with them so that employees can continue to learn and apply their in-house training towards college/university diplomas or professional designations. Providing informal learning opportunities through providing full time or part time temporary assignments, participation in special projects, membership on a cross-functional team or participation in short transfers to different departments support workers to learn and grow. Other beneficial WFD practices include training internal trainers, mentors and coaches which enables the organisation to utilize

internal expertise to increase personal and professional self-esteem, provide overall training consistency, and provide internal experts who are role models and who understand the organisation, the culture and the key skill families. These internal trainers, coaches and mentors can spot unknown internal talent and give them the encouragement they need to move on (Blackburn*, et al.,* 2013; Bowes, 2008).

In addition, formalising employee mentoring allows for the identification of employees' skill needs and the assignment of mentors for short periods of time to bridge skill gaps and develop needed skills. Creating a dual career track for workers, for instance, technical v managerial, and trainer, mentor, adviser v. supervisor allows ensures that employees who excel at training, mentoring and coaching can progress without having to attain managerial positions. Integrating career management and career development involves managers working with employees to review performance and to plan for continuous learning and career development, and setting up programmes that are progressive, meet individual interests while satisfying organisational objectives (Blackburn *et al.,* 2013; Bowes, 2008; Fayek *et al.,* 2006).

According to DeTuncq and Schmidt (2013), performance management involves business and individuals setting goals, managing and measuring performance required to achieve strong individual and business performance; and business goals cascade downward to achieve performance alignment. Performance management involves agreeing baselines, job evaluation and compensation and reward systems (Guest, 1997; Kyriakidou, *et al.*, 2013). 360 evaluations are useful in obtaining a balanced assessment of a individual worker's performance (DeTunq and Schmidt, 2013). Succession management focusses on effectively identifying, developing and transitioning individuals into key roles to

ensure continued business success. It includes replacement planning, identification and development of high-potential individuals, and management of talent pools. Organisations should encourage and support employee engagement or satisfaction; focus on tools and programs that reward and motivate individuals such as incentive programs, diversity initiatives, employee resource groups and recognition programmes (DeTuncq and Schmidt, 2013).

3.5.3 Learning Environment

Carrim and Basson (2013) opine that learning within organisations is a multilevel process at organisational, group and individual levels. Organisational support in providing a learning environment, culture and resources and in providing rewards to incentivise group performance is important (Carrim and Basson, 2013). Best practices for learning include the use of workgroups (teams, crews) to balance skill sets and the breaking down of functional silos by using job rotation (WEF, 2016). Successful learning at group level depends on willingness of members to share information and to integrate their individual capabilities in generating and utilising knowledge. The willingness to learn and to become involved in learning requires individual commitment without which, learning will not take place no matter the strategies put in place by management (Carrim and Basson, 2013). Nafukho (2013) highlights the importance of individual choice in capacity development, holding that planned development is most likely to fail where individual choice is lacking. Ahmad *et al*. (2015) found that capacity building of employees enhances their performance only when the career development of the employee is also enhanced.

Carrim and Basson (2013) note that organisational cultures are pivotal contributors to corporate learning as they shape values, beliefs and work systems that either enhance or obstruct knowledge acquisition and learning. An organisation therefore needs to build a culture of trust, communication, openness and innovation where opportunities for learning are provided and learning is supported by adequate learning resources. Learning resources include knowledge sources and knowledge tools made easily accessible to workers at all levels and locations and availability of training instructors, coaches, mentors and learning facilitators (Du Plessis, et al., 1999). Toyota believes that performance is driven by people not systems and that learning must occur on the job every day and must involve everybody, therefore, the organisation's design must support WL (Balle and Handlinger, 2012). Learning environments have been successfully developed and maintained in the automotive industry. For instance, Dankbaar (1999) reports that Rover and Ford have installed "open learning centres" in some of their manufacturing plants featuring individual work stations where workers can undertake computerised training programmes combining audio, video and text. Citroën and Peugeot also provide distance learning modules in topics such as diesel technology, electricity and accounting. Raidén and Dainty (2006) present the result of a case study which suggests that construction organisations in the UK adopt sophisticated HRD practices albeit unintentionally rather than as targeted strategic policy. Julius Berger (engineering construction) in Nigeria provides mobile training centres at some of its construction sites. Construction firms such as Arup (global engineering design and consultancy) and Transnet (rail, ports and pipeline infrastructure) in South Africa have well developed WfD systems and these need to become more widespread in the African AEC industry (WEF, 2015; WEF, 2016).

Harrison (2009) makes a case for performance alignment arguing that learning and development needs to formulate a mission, goals, and strategies for achieving corporate goals. Learning and development must fit with wider HR strategy, must be aligned with corporate strategy, and must produce the learning and development strategy. Vaughan (2008) argues that workplace learning works best when the strategic directions of the business and the nature of its challenges and opportunities are reflected in the aims and processes of workplace learning. At business unit level, potential learning and development systems should be developed in line with the strategic needs of the business unit or project.

At operational level, it is necessary to ensure that individuals and team performance targets are met (adapting to the needs of the business and the needs and aspirations of people). Information acquisition and motivation of people for business ensure that the learning and development activity is expertly carried out and appropriately evaluated with feedback (Harrisson, 2009). Barriers to workers using their skills and knowledge in support of business goals and targets need to be identified and dealt with (Harrison, 2009). Marquardt (2011) suggests that workforce practices such as selection, promotion, rewards, recognition, and information management should be aligned to reinforce and drive desired behaviours.

3.5.4 Barriers to Construction Workforce Learning and Development

Factors militating against WLD within organisations are cost of training, the availability of directly relevant training, uncertainty and ignorance about products such as investment in people and vocational qualifications (Wang *et al*., 2008). However, Informal learning should be given the acknowledgement and prominence it warrants.

Moorby (1996) outlines communication chasms and complexity as barriers to effective WLD.

Chan and Marchington (2012) present case studies which suggest that the alleged benefits of HRD are not always met, because of challenges in integrating the agenda of industry regulators with the needs of workers and construction organisations. In addition, the project-based nature of construction, the temporary nature and structure of project organisations and the high level of sub-contracting, blur organisational boundaries leading to challenges of performing HRD responsibilities and establishing the link between HRD and organisational strategy. Chan and Marchington (2012) also argue that firm-level analyses are inadequate to achieve the aspirations of life-long learning agenda and the goals of the knowledge economy. Equitable partnerships that ensure the involvement of a range of employers and employees as is the case in Germany are needed.

Ofori (2002) noted the project-based nature of construction and its traditional involvement of many organisations as the main hindrances to learning and innovation. In the same vein, Chan and Marchington (2012) outlined factors that influence the implementation of HRD by construction firms and they included the tendency of firms to retain only a core group of workers and having ad hoc and largely unstructured HRM strategies. However, Dainty *et al.* (2007) argue that though it may appear to be rational behaviour at firm level for construction firms not to invest in the development of employee skills due to the prevalent temporary work relationships, the entire construction industry experiences workforce problems. When every firm is reluctant to

invest in skills development, shortages hamper productivity, damage work quality and inhibit innovation.

From this background, the next section explores the potential for adopting WfD concepts and practices by construction organisations.

3.5.5 Shaping the Construction Workforce

Shaping the future of the workforce commences with strategic workforce planning, then smart hiring and enhanced workforce retention strategies. One identified cause of the inability of construction firms to attract and retain young talented people is the poor image the industry has as an employer. Construction work is considered physical, is carried out under uncomfortable and unsafe environments (the 3Ds - dirty, difficult and dangerous), and utilises low wage regimes. Other criticisms of construction work are that it does not provide job insecurity, and lacks career progression paths (Hall and Sandelands, 2009; Kikwasi, 2011; WEF, 2016). To counter this, construction organisations individually and collaboratively need to confront the image problem with a robust campaign to promote the industry as the 'preferred employer' by improving wages comparable to other sectors, offering opportunities for career progression, training, role models, greater diffusion of technology, marketing strategies that focus on specific groups such as women and young people (Hall and Sandelands, 2009; WEF, 2016).

Horwitz (2013) found that organisations tend to have strategies for attracting needed skills without concomitant strategies for retaining them and suggests firm level strategies which include: developing a WL culture; providing skills development

opportunities; allowing flexible employment practices; developing a reward and benefit system; ensuring employment equity; implementing effective talent management schemes; and possibly re-employing older, retired highly skilled and experienced people in training, mentoring and coaching roles.

Continuous learning in the workplace has been established as a means for continuously increasing workforce capability, improving workforce retention and optimising organisational performance. However, efforts need to be continually aligned with business strategy (Abdel-Wahab, *et al*., 2008; WEF, 2016). Workplace learning offers rich development opportunities and multiple approaches which should integrate informal (coaching, mentoring; problem-solving; hypothesis testing; job-shadowing) with formal (classroom-like training) methods (Manuti *et al.*, 2015; WEF, 2016). Learning design should also exploit technology by adopting, eLearning, simulation-based training and automated tracking of learning (Ayoo and Lubega, 2014; WEF, 2016). WfD must include all staff and learning programmes should therefore customise offerings to different target groups such as construction workers, functional experts, and senior management. In addition, learning design needs to take into consideration the different needs of diverse generational groupings such as traditionalists, baby boomers, generation X and millennials (Manuti, 2015; WEF, 2016; Yassa, 2014).

An important component of WD in any organisation is an effective knowledge management system which allows for the capture, organisation, storage, accessibility, diffusion, and utilisation of knowledge usually leveraging on ICT (Egbu, et al., 2003). The construction industry lags behind other sectors in the harnessing of ICT for performance improvement (Oladapo, 2007; Varghese, 2012). Varghese (2012) suggests that a cultural

shift is required to move construction sectors in emerging countries from traditional practice to full-fledged industries with a culture of sharing information and learning from mistakes and successes. Knowledge sharing and management can be greatly enhanced using ICT based platforms from simple media such as smartphones, websites and videos to personalised e-learning environments and sophisticated databases with indexed representations and categorised searches (Alshawi *et al*, 2006; Bowden, *et al*., 2006; Varghese, 2012).

The unique nature of construction business and its product may create peculiar challenges for workforce learning and development, but finding solutions to these challenges is the only option. The next segment of this review examines the status of WfD in Nigeria to outline problems and suggestions for industry improvement in this area.

3.6 Human Capacity in the Nigerian Construction Industry: Problems and Prospects

According to Kululanga (2012), the majority of indigenous construction organisations in developing countries lack capacity and cannot meet construction demand. Also, Osabutey *et al.* (2012) describe capacity development in developing countries as 'stunted'. The term capacity relates to the abilities, skills, knowledge, learning attitudes, values, relationships, behaviours, motivations, resources and conditions that enable individuals, organisations and systems to carry out functions effectively, efficiently and innovatively in order to achieve their development goals (National Planning Commission, 2014). According to Horwitz (2013), modern day organisations require people who not only have technical and functional skills but also life skills, emotional

intelligence, the ability to adapt to rapidly changing environments, ability to work effectively in project teams, leadership skills and social skills. Britz, *et al*. (2006) argue that because it is the most valuable asset of knowledge societies, Africa needs to invest heavily in its human capital.

Capacity development relies to a large extent on learning, acquiring knowledge and adapting behaviour; it also involves unlearning behaviours and practices that are detrimental (Kululanga, 2012). Furthermore, Manuti, *et al*. (2015) note that the establishment of knowledge societies emphasises knowledge building and the learning process as strategic factors in individual career development, organisational success and global competitiveness.

Construction firms are traditionally reluctant to train and develop employees despite evidence of the benefits and contribution to individual and corporate performance. (Dainty *et al.*, 2007; Osabutey *et al.*, 2012; Wang *et al*., 2010). Horwitz (2013) considers private enterprise training vital to support and sustain the improved levels of skills required for infrastructure projects. Manuti *et al.* (2005) report that the workplace has become a site for learning for two different purposes: development of the enterprise and the development of individuals' capacity. Kululanga (2012), on the other hand, argues for an alignment between the changing requirements of industry and the educational curricula to allow education and training providers to remain the main suppliers of construction skills while HCD initiatives at organisational level be limited to recruitment, adopting a culture of improvement, partnerships in research and sharing best-practices with other organisations.

Africa's institutions, however, may be ill-equipped to fully cope with the rapid rates of new knowledge generation and innovation (AfDB, AUC, and NEPAD, 2010). For instance, Yassa (2014) identified a skills mismatch in the Egypt construction industry with attendant lengthy school-to-work transitional periods, sluggish job creation cycles and graduate unemployment (34.9% in 2007) and therefore an integration of the education system with workplace capacity development initiatives was suggested. Studies in the South African construction industry report similar results in the areas of property development graduates (Othman, 2014), construction project management education programmes (Rwelamila, 2007), and artisans, supervisors and skilled instructors (Hall and Sandelands, 2009). In Zambia, Muya, *et al.* (2006) found poor quality and shortage of construction craft skills and suggested that as the development agenda for sub-Sahara Africa gains momentum, attention needs to re-focus on effective and sustainable HRD strategies.

Adeyemo *et al.* (2010) found skills mismatches between Nigerian university graduates and labour market demands, and attributed this to poor educational standards and a concentration of theory based learning without the development of practical skills, consequently, leading to education that is not relevant to the challenges of the market. The skills mismatches have persisted over the years as evidenced by further studies such as Akinyemi *et al.* (2012) who found that Nigerian graduates do not possess the work skills required by the labour market and this has led to graduate unemployment which rose from 25.6% in 2003 to 40.3%in 2009.

In 2016, the Nigerian National Bureau of Statistics (NBS) put graduate unemployment at 23.2% and graduate under-employment at 17.2% in 2016. The Nigerian NBS defines

under-employment as working for less than 40 hours a week, but more than 20 hours a week (on the average), or working at a job that underutilises one's skills, time and/or educational qualifications (NBS, 2016). Whereas, unemployment was defined as the proportion of the total currently active labour force who were actively looking for work but could not find work for at least 20 hours during the reference period (NBS, 2016).

ILO (2016) largely attributed graduate unemployment in Nigeria to the increased number of school graduates with no matching job opportunities. While Muo (2016), concluded that skills mismatches have not led only to high graduate unemployment levels but to the need to import expertise as well. To counter this trend, more frequent curriculum reviews in Nigerian academic institutions have been advocated to align the skills learned in schools to the needs of the market (Adeyemo, et al., 2010; Akinyemi, et al., 2012; Muo, 2016). Furthermore, Ameh and Odusami (2014) found a variety of deficiencies in the project management skills of construction professionals in Nigeria. Adindu and Ofoegbu (2014) referred to subsisting weaknesses in academic and professional curricula that threaten the ability of Nigerian quantity surveyors to deliver cutting edge services to the construction industry.

Given the pace of knowledge generation and speed of knowledge diffusion, curriculum reviews may not be able to keep pace with the rapid changes in market skill requirements and organisations may need to device mechanisms for continuous WfD (Cullen, *et al*., 2002; Manuti, *et al*., 2015; Vaughan, 2008).

The situation with intermediate construction skills (artisans, technicians, supervisors, instructors) is peculiar considering the fact that, in many developing countries,

construction firms draw most of their construction labour from informally trained groups (Darko and Lowe, 2016; Jayawardane and Gunawardena, 1998; Kikwasi, 2011). According to Kikwasi (2011) a major part of this segment of the workforce does not cope well with the pace of technology, material and method changes; consequently, leading to low productivity and poor quality workmanship. Darko and Lowe (2016) remark on the unreliable quality of both formal training and informal apprenticeships in the Ghanaian construction sector. In Tanzania, 50% of construction labour have no schooling or formal training, 2% went through an apprenticeship, 23% through technical schools, and 8% through construction organisations (Kikwasi, 2011).

The situation in Nigeria with intermediate skills is not much different. Awe *et al.* (2011) discuss shortages of construction skills in Nigeria, in terms of both quality and quantity, paradoxically existing alongside high unemployment levels. Awe *et al.* (2009) and Medugu *et al.* (2011) found that the Nigerian construction industry suffers from fairly severe skill shortages and the quality of work of the intermediate skilled workers is quite low. The reasons for the situation were found to be weak training systems which allowed for individuals to be employed on construction sites without prior training (Awe *et al.,* 2009; Iro *et al*., 2013) leading to poor quality of finished construction work, high levels of waste and low productivity relative to other countries (Afolabi *et al.,* 2016).

These findings constitute a threat to the Nigerian construction industry given that construction activity is forecast to grow by 160% between 2015 and 2030 (Global Construction Perspectives and Oxford Economics, 2015). The suggestion is that institutional contribution to HCD may be inadequate in meeting the requirements of industry (Tan, *et al.*, 2011). The issue is fundamental and the Nigerian construction

industry needs to address it. Construction firms may need to bridge the gap in institutional skills learning provision with organisational WLD initiatives at all levels (Kululanga, *et al.,* 1999).

In addition, organisations are better placed to forecast their own workforce needs and can therefore organise for the provision of needed skills through various mechanisms to align skills supply with demand in real time (WEF, 2016). Skills development for the construction industry invariably involves a practical element that is best learned in context. This is strongly supported by educational learning theories such as WL, situated learning and communities of practice (Eraut, 2004; Lave, 1991). Learning is therefore no longer about merely producing knowledge, competence, skill and expertise in individuals as static products but is a continuous process of human development (Hager, 2004).

The complexity of construction organisations and project sites provide rich and fascinating arenas for the learning of construction skills experientially and also for the co-constructing of new knowledge. Construction sites therefore remain at the heart of the learning, education, training and development systems for construction skills. The challenge for the industry is how to turn construction sites into learning and developments environments without disrupting but rather enhancing the flow of work.

3.7 Summary

Learning in the workplace has taken on greater significance given the changing nature of work resulting from the acceleration and transience of knowledge that characterise knowledge age economies and societies. In addition, Information Communication

Technology (ICT) has expanded accessibility to sources of knowledge making it available more efficiently and unbounded by location or time. Learning is therefore no longer about merely producing knowledge, competence, skill and expertise in individuals as static products but is a continuous process of human development (Hager, 2004). Minimum expected levels of learning and human development may be prescribed but no upper limits can be (Blanc, et al., 2012; Hager, 2004), because the pace of knowledge and technological advancement ensure that what is fact today may be false tomorrow and what is skill or expertise now may not be required by the workplace in the immediate future, an ever-shifting reality (Siemens, 2004).

The process of learning therefore involves making the connections between the diverse sources of knowledge, choosing what to learn to solve the current problem by drawing distinctions between important and unimportant information, being able to detect patterns in the information and to recognise when new information alters the landscape on which the decisions of yesterday were made. The capacity to know more now becomes more critical than what is currently known (Siemens, 2004; Steffens, 2015). The capacity to continuously learn in different contexts draws on a different set of human capabilities than those traditionally developed in educational institutions thereby expanding the skill set for workers in the knowledge economies to include the following: the abilities to locate, assess and represent knowledge; ability to communicate knowledge to others; ability to work productively in collaboration with other people; the abilities to learn, unlearn and relearn; adaptability; creativity; innovative skills; self-awareness; and most importantly, self-directed learning abilities (Drucker, 2000; Kostos, 2006; NZCER, 2014; Toffler, 1970). The development of these personal aspects of human capability is therefore critical for workplace learning.

Although construction organisations are not traditional learning institutions, they are still rich sources of a wide variety of knowledge (tacit, experiential, procedural, propositional, and potential). Where relevant and current knowledge from within and from outside the organisation is made accessible to workers at all levels and the human capability to process, utilise and produce new knowledge is developed and activated, the potentials for individual and therefore corporate performance optimisation may be greatly improved.

The main questions therefore are: how can construction firms harness the learning potential of their organisations to improve individual worker performance effectively and efficiently to meet their business goals?; can a construction firm organise to make sources of relevant and current information available to workers at all levels efficiently and effectively?; can the learning capabilities of workers at all levels be developed and activated to effectively process, utilise and produce knowledge while meeting organisational and personal goals?; what are the individual attributes that underpin learning and performance in a workplace context?; and by focusing learning experiences of individual workers on the significant attributes for learning and performance while aligning with organisational goals, can construction firms optimise organisational performance effectively, efficiently and competitively?

This chapter examined a wide range of theories, concepts and practices that impact on WLD in order to improve individual and organisational performance. It also looked at barriers to these practices filtering into construction businesses. The problem of human capacity and construction WfD in Africa generally (and Nigeria in particular) was discussed. The Nigerian construction industry is beset by skill shortages and skill gaps at

the level of intermediate skills and the situation has been described as severe. Afolabi *et al.* (2016) found it paradoxical that skill shortages are prevalent in a country of over 180 million people. This is significant given the country's 6.6% unemployment and 9.9% youth unemployment figures for 2017. The situation may reach crisis levels with the forecast 160% increase in construction activity (Global Construction Perspectives and Oxford Economics, 2015) and the expansive infrastructure projects planned for the next three decades (AfDB, AUC, and NEPAD, 2010; National Planning Commission, 2014).

The shared responsibility of Nigeria's basic education system, VET system, construction organisations, and individual workers for workforce development was articulated. The VET system has been found to be weak evidenced by the quality of entrants into the construction workspace. Construction organisations in Nigeria need strategies and mechanisms for developing their workforce at this level. Furthermore, with fast paced changes in knowledge, nature of work, technology and business environment, life-long learning and workplace learning have become critical for construction organisations. This research focuses on construction WLD within construction organisations in Nigeria with the aim of developing a conceptual learning and development model that will continuously improve workforce capacity for performance in the organisation's objectives.

In order to achieve this, the research adopted a configurations approach that essentially configures a set of individual learning practices (Annex 1.1 and Annex 1.2) and workplace learning practices (Annex 1.3) that predict superior performance together with the organisation's strategy. In selecting an effective combination of practices, it is essential that the practices are interrelated and internally consistent and that they substantially

overlap and mutually reinforce each other to impact on performance (MacDuffie, 1995; Stiles and Kulvisaechana, 2003)

To this end, a generic list of WLD practices that have the potential to optimise individual worker performance and consequently organisational performance is found in Annex 1.3 of the appendices. These generic practices which were synthesised from literature and appropriately referenced will be contextualised for the Nigerian construction industry in the next phase of this research to determine the set of practices that contribute to superior performance. The next chapter provides details of the research methodology.

CHAPTER 4 RESEARCH METHODOLOGY

4.1. Introduction

This chapter presents the concepts and principles of research methodology related to this research. It also presents the research rationale and describes the methods of data collection and analysis employed to accomplish the aim and objectives outlined in Section 1:4.

4.2 Research Methodology Concepts

4.2.1 Research and Research Methodology

Neuman (2006) described research as "a way of going about finding answers to questions" and social research as "a collection of methods and methodologies that researchers apply systematically to produce scientifically based knowledge about the social world". For Remenyi *et al.* (1998), research methodology refers to the procedural framework within which the research is conducted. According to Fellows and Liu (2015), research methodology refers to the principles and procedures of the logical thought processes which are applied to a scientific investigation. The main factors that drive the selection of research methodology are the subject area for the research, the specific research questions and the resources available (Remenyi, et al., 1998). However, whatever the method selected, research should be: rigorous and objective (Fellows and Liu, 2015); relevant (Hui and Fatt, 2008); transparent; appropriate for the research problem and provide utility (Peters and Howard, 2001); related to existing theory; and justified by evidence (Baldridge, et al., 2004).

4.2.2 Methodology Design Framework

Several frameworks have been produced for the design of appropriate research methodology. For instance, Saunders *et al.* (2016) proposed a layered approach much in the form of 'onion' layers with six layers, the outermost layer being research philosophy, the next layer, approach to theory development, followed by methodological choice, research strategy, time horizons and the innermost layer made up of techniques and procedures. The researcher is expected to move from the outermost layer to the innermost, understanding and explaining the choices made in relation to the research and systematically connecting each of the different layers. Epistemology, theoretical perspective, methodology and techniques are the four research elements proposed by Crotty (1998). Kagioglou *et al.* (1998) proposed a 'nested' approach comprised of three interrelated elements: research philosophy; research approach; and research technique as shown in Figure 4.1.

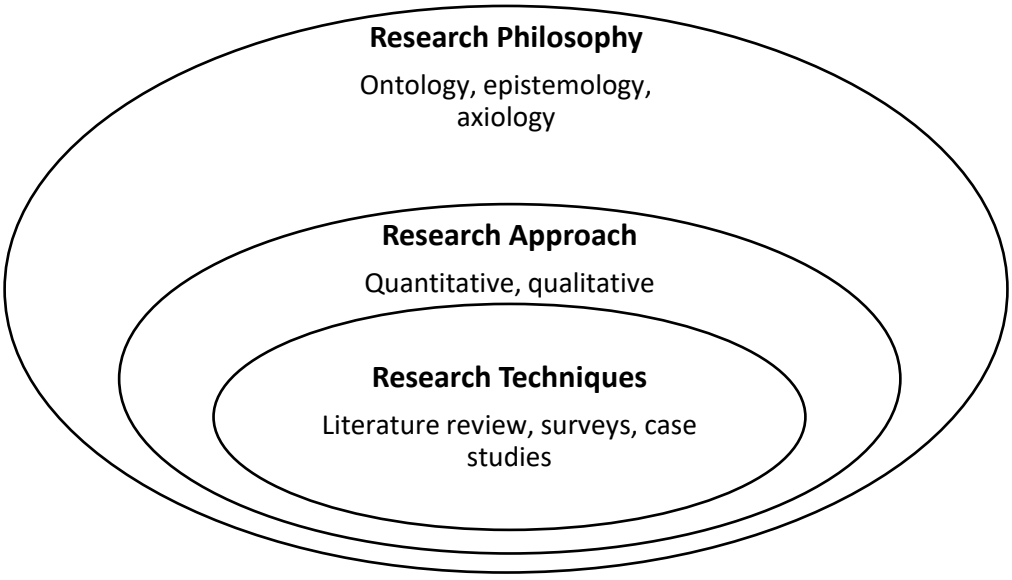

Figure 4.1 Nested approach to research methodology design
Source: Kagioglou (1998)

The nested approach allows the researcher to first understand the philosophical posture of the research which in turn enables the determination of the underpinning

assumptions that define the research approach. These assumptions and views about how research should be conducted and the assumptions about the nature of social phenomena influence the research process (Bryman and Bell, 2015) and subsequently guide the selection of the appropriate research techniques.

4.2.3 Research Philosophy

The word philosophy originates from the Greek word *philosophia* which means "the love of wisdom". Saunders *et al.* (2016) noted that research philosophy refers to a system of beliefs and assumptions about the development of knowledge. Research philosophy therefore typically involves thinking about and answering questions related to the fundamental nature of knowledge, reality and existence. For example, what constitutes 'reality' and 'existence' apart from objects and events or what are the assumptions in conceptual reality and the question of existence (Fellows and Liu, 2015). These are ontological considerations which can often influence the research process (Bryman and Bell, 2015). Epistemological considerations embrace the nature of knowledge, its origin and the limits of human knowledge (Fellows and Liu, 2015) and they determine how the social world should be studied (Bryman and Bell, 2015). Furthermore, it is also important that the researcher should acknowledge their own value positions and perceptions. These are axiological considerations which tend to influence researcher decisions and judgements (Saunders *et al.*, 2016).

These philosophical considerations offer a framework for thinking and for improving the alignment between what researchers think and do. They therefore enable the researcher to clarify research designs, recognise appropriate research designs and to

even create designs that are outside of the researcher's prior experience (Easterby-Smith *et al.*, 2015).

4.2.3.1 Ontological Considerations

Ontology refers to assumptions about the nature of reality (Saunders *et al.*, 2016). The central question in ontology is whether entities have a reality external to an individual's ability to acquire knowledge about them or whether they are considered as constructions built-up from the perceptions and activities of social actors (Bryman, 2016). Similarly, whether the object of investigation is a product of consciousness (nominalism) or it exists independent of consciousness (realism) Remenyi (1998). Dainty (2008) describes ontology as "conceptions of reality". For instance, objectivist ontology views social phenomena as existing independently of social actions whereas constructivist ontology infers that social phenomena are created by social interactions and therefore are always in a state of flux (Bryman, 2016; Dainty, 2008).

4.2.3.2 Epistemological Considerations

Epistemology concerns assumptions about knowledge, what constitutes acceptable, valid and legitimate knowledge and how knowledge is communicated to others (Burrell and Morgan, 1979). Bryman (2016) defined epistemology as a theory of knowledge, specifically, a stance on what constitutes acceptable knowledge in a discipline. For instance, is knowledge limited to objective fact (positivism) or is it constructed in the perceptions of social actors (interpretivism)? Such considerations raise questions about how the social world should be studied (Easterby-Simth *et al.*, 2015). Positivist researchers focus on facts, look for causality and fundamental laws, and reduce phenomena to its simplest elements in order to study them. Interpretivist researchers,

on the other hand, focus on meanings, try to understand what is happening and look at the totality of each situation (Remenyi *et al.*, 1998).

4.2.3.3 Axiological Considerations

Axiology refers to the role of values and ethics within research, fundamentally responding to the questions of how the researcher deals with their own values and those of the research participants in making judgements and choices related to the research (Saunders *et al.*, 2016).

4.2.3.4 Objectivism and Subjectivism

According to Saunders *et al.* (2016), subjectivism and objectivism represent two extremes on multidimensional continua (Niglas, 2010) of business and management research philosophies. At one end of each continuum, objectivism holds that like natural reality, social reality has an existence independent of the social actors involved (Bryman, 2016). At an ontological level, objectivist researchers embrace realism and believe that there is only one social reality experienced by all social actors (Saunders *et al.,* 2016). This social reality is made of hard, tangible and relatively unchanging entities including major social structures into which individuals are born (Burrell and Morgan (1979). Consequently, at an epistemological level, objectivist researchers adopt positivism to explore social realities through observable and measurable facts culminating in the derivation of laws and generalisations similar to those produced by physical and natural scientists (Remenyi *et al.,* 1998; Saunders *et al*., 2016). At an axiological level, objectivist researchers keep research free of values, which are regarded as bias (Saunders *et al*., 2016).

At the other end of the continuum, subjectivist researchers assert that social reality is constructed from the perceptions and consequent actions of social actors (Saunders *et al.,* 2016). At the ontological level, subjectivist researchers embrace nominalism which in its extreme form considers that order and structures are created by social actors through language, conceptual categories, perceptions and consequent actions. For nominalists, there is no underlying reality to the social world apart from what social actors attribute to it and, since each individual perceives and experiences reality differently, there are multiple realities rather than a single universal reality (Burrell and Morgan (1979). Social constructionism is a less extreme version which considers that reality is constructed through social interactions by social actors as they create partially shared meanings and realities (Saunders *et al*., 2016).

To cope with the ever-changing realities created by continuous social interactions between social actors, the subjectivist researcher studies social realities in detail including historical, geographical and socio-cultural contexts considering different opinions, perceptions and narratives. Epistemologically, the subjective researcher embraces interpretivism. Axiologically, subjectivist believe that while using data, they cannot detach themselves from their own values and therefore would rather acknowledge, reflect on and question their own values and incorporate them into the research (Saunders *et al.*, 2016).

4.2.3.5 Five Major Philosophical Positions

This section discusses five major philosophical orientations (lens) in business and management research. These are:

4.2.3.5.1 Positivism

Bryman (2016) describes positivism as an epistemological position that advocates the methods of the natural sciences to the study of social reality and beyond. Fellows and Liu (2015) submit that positivism recognises only non-metaphysical facts which can be observed and measured and which remain uninfluenced by observation and measurement. The position emphasises objectivity, measurement and repeatability (Fitzgerald and Howcroft, 1998).

4.2.3.5.2 Critical Realism

Critical realism explains what we observe in terms of the underlying structures of reality that shape the observable event (Saunders, *et al.*, 2016). It is a realist epistemology that the study of the social world should involve identifying and understanding the structures that generate that world in order to change them (Bryman, 2016). Critical realism unlike positivism is not empiricist.

4.2.3.5.3 Interpretivism

Interpretivism is an epistemological position (Bryman, 2016) where truth and reality are social constructs rather than existing independently and researchers determine truth and reality from participants' collective perspective (Fellows and Liu, 2015). This position holds that there are no universal truths and places emphasis on the realism of context (Fitzgerald and Howcroft, 1998).

4.2.3.5.4 Postmodernism

Postmodernism holds that reality is complex and socially constructed through power relations and what counts as truth and knowledge is decided by dominant ideologies.

The postmodern researcher is radically reflexive (Saunders *et al.*, 2016).

4.2.3.5.5 Pragmatism

Pragmatism originated in the USA in the work of philosophers such as Pierce (1878), James (1921) and Dewey (1939). Pragmatism recognises that there are various ways of viewing the world and undertaking research, no single perspective can give a full picture, and though there are multiple realities, some are better than others (Kelemen and Rumens 2012, Saunders *et al.*, 2016). Pragmatists hold the view that reality is complex with processes, experiences and practices continuously changing. Epistemologically, pragmatists hold that acceptable theories and knowledge are those that have practical value in specific contexts, and that enable successful action. Accordingly, the focus of pragmatism research is on problem solving and informed future practice as contribution (Saunders *et al.*, 2016).

In relation to construction research, El-Diraby (2012) argues that construction combines science knowledge with extensive social, communication and linguistic aspects and consequently multiple views of reality need to be accepted, the fuzziness of concepts admitted and the conceptual changes in the representation of knowledge accommodated. This is possible within the pragmatic philosophical orientation which aligns with Nilgas (2010) observation that pragmatism is often referred to as the most suitable philosophical orientation for the mixed methods research tradition. Similarly, Kelemen and Rumens (2012) recommended a heterodox and more pragmatic approach to methodology.

4.2.3.6 Research Paradigms

According to Fellows and Liu (2015), a paradigm is a theoretical framework which includes a system by which people view events (a lens). Paradigms not only determine the views adopted by the researcher but also their approach to questioning and discovery. Burrell and Morgan (1979) presented a two-by-two matrix map that relates to the ideological orientation of researchers towards the social world under investigation. The ideological dimension has sociology of regulation at one extreme and sociology of radical change at the other extreme of the continuum. The regulation perspective deals with the need to regulate societies and behaviour assuming an underlying unity and cohesiveness of social systems (Saunders *et al.*, 2016). The radical change perspective fundamentally challenges the way things are currently done and the research approach to organisational problems would be the viewpoint of upending the status quo (Saunders *et al.*, 2016). Burrell and Morgan (1979) combine the objectivist – subjectivist continuum with the regulation-radical change continuum to create the matrix map with four distinct and rival paradigms of organisational analysis (Figure 4.2).

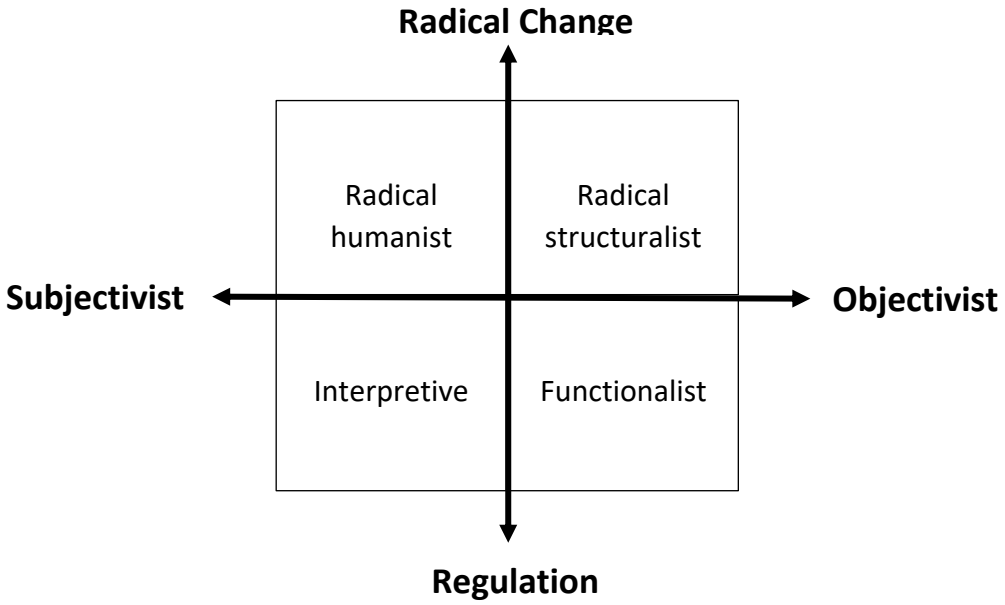

Figure 4.2 Four paradigms for organisational analysis

Source: Burrell and Morgan (1979)

Research in the functionalist paradigm is concerned with rational explanations and making recommendations within the current structures. Functionalist theories and models of management are often generalised to other contexts providing they are correctly implemented and monitored (Kelemen and Rumens, 2008). Research in the interpretive paradigm involves participating in the organisation's activities to understand and explain what is going on rather than change things (Kelemen and Rumens, 2008).

Research in the functionalist paradigm is concerned with rational explanations and making recommendations within the current structures. Functionalist theories and models of management are often generalised to other contexts providing they are correctly implemented and monitored (Kelemen and Rumens, 2008). Research in the interpretive paradigm involves participating in the organisation's activities to understand and explain what is going on rather than change things (Kelemen and Rumens, 2008). Research in the radical structuralist paradigm is conducted to achieve fundamental change based on organisational phenomena (Saunders *et al.*, 2016). Research in the radical humanist paradigm would be concerned with changing the current state of things fundamentally but with an approach that emphasises the importance of social construction, language, processes and instability of structures and meanings in organisational realities (Saunders *et al.*, 2016).

Some organisational scholars argue that the different paradigms are underpinned by mutually exclusive assumptions and therefore cannot be combined (Burrell and Morgan, 1998) while some others argue that one can take a position on the continuum between two extreme assumptions and can therefore combine paradigms (Niglas, 2010;

Saunders *et al.* 2016). Lewis and Kelemen (2002) and Sanderson (2013) advocate multi-paradigm enquiry in project management research for their capacity to reveal disparate but interdependent facets of complex phenomena. Similarly, Soderlund (2001) concludes that plurality in project management research should be embraced to illuminate the complex activities of projects and project management practice. Dainty (2008) suggests that a more expansive outlook in mixing methodologies and research paradigms could yield deeper insight into the practice of construction management and could offer the potential of overcoming the weaknesses of single paradigm approaches.

4.2.4 Research Approaches

The research strategy provides the overall direction of the research (Remenyi *et al.*, 2000). Bryman and Bell (2015) describe research strategy as a general orientation to the conduct of business research. At a strategic level, the research process is defined in broad terms that take into account the philosophical positioning taken by the researcher (Remenyi, 2000). The two broad categories of research approaches used are qualitative and quantitative research (Bryman, 2016; Fellows and Liu, 2015; Leedy and Ormrod, 2010). The main differences between the two is that qualitative research employs words and quantitative research employs quantification in collection and analysis of the data. Neuman (2006) notes that though qualitative and quantitative approaches are different in many ways, they can complement each other. This happens when both approaches are used together in a third approach known as the mixed method approach. The three approaches are described in the next sections.

4.2.4.1 Qualitative Research Methodology

Creswell (2014) defines the qualitative approach in research as "one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives or advocacy/participatory perspectives or both". Leedy and Ormrod (2010) observe that qualitative approaches focus on phenomena that occur in their natural setting and they are studied in all their complexity with no attempt to simplify the phenomena. According to Bryman (2016), another feature of the approach is that words are emphasised rather than quantification in the collection and analysis of data. Neuman (2006) uses the phrase "soft data" to describe the data collected and analysed and these may include words, photos, impressions and symbols.

Qualitative research follows a non-linear path, is inductive, interpretivist, and constructionist (Bryman and Bell, 2015; Nueman 2006). The qualitative researcher often collects open-ended, emerging data about a problem with the primary intent of developing themes or uncovering trends from the data to develop a deep understanding of the subject of study (Creswell, 2014). Qualitative research uses research methods such as phenomenology, ethnography, grounded theory, narrative research, or case studies (Cresswell, 2014; Leedy and Ormrod, 2010; Neuman, 2006). Qualitative research studies are usually used for the purpose of description, interpretation, verification and evaluation (Leedy and Ormrod, 2010). Fellows and Liu (2015) acknowledge the potential of qualitative methods for getting beneath and facilitating understanding of the underlying causes and principles of problems identified from quantitative studies. However, Bryan and Bell (2015) outline the main criticisms of the qualitative approach as: qualitative research being too subjective; difficult to replicate; having problems of generalisation; and lack of transparency.

4.2.4.2 Quantitative Research Methodology

Creswell (2014) defines the quantitative approach in research as one in which the investigator primarily uses positivist claims for developing knowledge, employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data. Quantitative research follows a linear path, is deductive, and embraces positivist perspectives (Bryman and Bell, 2015; Nueman 2006). It also uses research methods such as experiments and surveys (Cresswell, 2014; Leedy and Ormrod, 2010; Neuman, 2006).

A pivotal feature of quantitative research is measurement of variables using commonly accepted measures of the physical world or carefully designed measures of psychological characteristics or behaviour measures such as tests, questionnaires or rating scales (Leedy and Ormrod, 2010). The purpose is to establish, confirm or validate relationships between variables and to develop laws or generalisations that contribute to existing theories (Leedy and Ormrod, 2010). Bryman (2016) agrees that the approach usually emphasises quantification in the collection and analysis of data. Neuman (2006) uses the phrase “hard data” to describe the data collected and analysed in quantitative research and these are usually in the form of numbers. Another key feature of qualitative research is objectivity. Quantitative researchers strive to choose methods that allow them to objectively measure variables of interest and to remain detached so as to arrive at unbiased conclusions (Leedy and Ormrod, 2010).

Quantitative research uses standardised methods, consequently achieving more reliability and validity with results, and allowing for comparison of similar studies (Leedy and Ormrod, 2010). Quantitative methods are able to handle and summarise vast

amounts of data. This eliminates bias from studies with large sample sizes and few variables (Fellows and Liu, 2015). However, Bryman and Bell (2015) outline the main criticisms of the quantitative approach as: quantitative research does not distinguish between physical objects and people and social institutions; measurement process may not be as objective and accurate as they seem; reliance on instruments and procedures hinders the connection between research and everyday life; and analysis of relationships between variables creates a static view of social life that is independent of people's lives.

4.2.4.3 Mixed Methods Research

Teddlie and Tashakkori (2011) define mixed methods research as: "a type of research in which a researcher or a team of researchers combine elements of qualitative and quantitative research approaches for the broad purposes of breadth and depth of understanding and corroboration". Mixed methods research has become an increasingly used and accepted approach to conducting social research (Bryman, 2016) as well as construction and built environment related research (Amaratunga, *et al*., 2002; Fellows, 2010). Holt and Goulding (2014), however, argue that although mixed method research has been used frequently in building and construction this is not usually formally recognised or acknowledged by the researchers in their reports. Dainty (2008) had noted this tendency by construction management researchers to use mixed methods and report them as single method research, while suggesting that a more expansive outlook towards mixing methodologies and research paradigms could yield deeper insights into, and understanding of, the practice of management in construction.

Creswell (2013) defined the mixed method approach as one in which the researcher tends to base knowledge claims on pragmatic grounds and employing strategies of inquiry that involve collecting data that includes both numeric information as well as text information so that the final database represents both quantitative and qualitative information. Several types of mixed method designs can be distinguished from literature but the most common forms are: convergent parallel design; exploratory sequential design; explanatory sequential design; and embedded design (Bryman, 2016).

Mixed methods have been used for various purposes in research and they include: triangulation to mutually corroborate results; to offset the weaknesses in each method and draw on the strengths of both; completeness to get a comprehensive account of the research domain; to provide a sense of process to the structures identified through quantitative studies; different research questions called for different approaches; one of the two is used to help explain the findings using the other method; unexpected and surprising results can be understood by employing the other; and research instrument development. Others are: sampling purposes; to provide credibility; to provide contextual understanding; illustration; to provide utility or improve the usefulness of findings; to confirm and discover; to integrate a diversity of views; and to enhance the strength and quality of results (Bryman, 2016; Johnson *et al.,* 2007).

4.2.5 Research Methods

These are the techniques or methods used for data collection and analysis (Fellows and Liu, 2015). They determine the logic that links the empirical data to the aim and objectives of the research on one hand and to the conclusions of the research on the other hand (Saunders *et al.,* 2016). Yin (2014) outlines five common research methods:

surveys, experiments, archival analysis, histories; and case studies. Similarly, Saunders *et al.* (2016) list experiments, surveys, archival research, case studies, ethnography, action research, grounded theory, and narrative enquiry as the main research designs/methods.

Experiments have their roots in the natural sciences and usually involve the precision of laboratory experiments where in its simplest form, an independent variable is manipulated to observe its effect on a dependent variable while keeping all other influences under control (Fellows and Liu, 2015; Saunders *et al.,* 2016). Experiments answer the questions 'how' and 'why' (Yin, 2014). Surveys are considered the most frequently used research method in business and management research (Holt and Goulding, 2014; Saunders *et al.,* 2016) and they answer the research questions, 'who', 'what', 'where', 'how many', and 'how much' (Saunders *et al.,* 2016; Yin, 2014). Surveys allow for the collection of standardised data from large populations in an economical way (Saunders *et al.,* 2016). Data collection methods include questionnaires and interviews (Fellows and Liu, 2015).

Action research is considered an emergent and iterative approach in which the researcher and the members of a social setting collaborate in the research to diagnose and develop solutions to real organisational or social problems (Bryman, 2016, Saunders et al., 2016). In action research, those being studied become part of the researchers (Neuman, 2006). Data collection methods may be quantitative (e.g. questionnaires) or qualitative (e.g. Interviews) (Bryman, 2016). Grounded theory method is used to develop theoretical explanations of social interactions and processes through an iterative approach (Bryman, 2016). The method was developed by Glaser and Strauss

(1967) where data collection and analysis go on simultaneously. Data is coded, reorganised into categories, relationships between categories are discovered, and categories are integrated to produce theory (Saunders *et al*. 2016). A central tool in this process is constant comparison, which entails constantly comparing new data with existing data and categories and, comparing categories with each other and with concepts (Bryman, 2016). Saunders *et al.* (2016) describe constant comparative analysis as a process of comparing each item of data with others as well as with codes and categories, checking for similarities, differences and relationships to discover emerging patterns or themes.

Narrative enquiry seeks to preserve chronological connections and the sequence of events as told by the narrator to enrich understanding and aid analysis. Ethnography has its roots in anthropology and is used to study groups. The researcher lives among the group being studied to observe and talk to them in order to provide detailed accounts of their shared beliefs, behaviours interactions, language, rituals, and culture. Archival analysis makes use of administrative records and documents as the principal source of data which could be quantitative data or qualitative data (Bryman, 2016). Archival analysis answers the research questions 'who', 'what', 'where', 'how many', and 'how much' (Yin, 2014).

Yin (2014) defines a case study as an empirical inquiry that investigates a contemporary phenomenon (case) in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident. According to Baxter and Jack (2008), the case study methodology provides tools for researchers to study complex phenomena within their contexts and consider it a valuable method for

developing theory, evaluating programmes, and developing interventions because of its flexibility and rigor. The method also allows the researcher to explore or describe individuals, organisations, interventions, relationships, communities or programmes through a variety of data sources (quantitative and qualitative) and supports the deconstruction and subsequent reconstruction of various phenomena. Thus, ensuring that an issue is not explored through one lens, but rather a variety of lenses which allows for multiple facets of the phenomenon to be revealed and understood (Baxter and Jack, 2008; Yin, 2014).

4.3 Research Methodology Adopted for this Research

4.3.1 Philosophical Position of this Research

The philosophical orientation of this research rests explicitly within the complexity of the construction research domain. Given this, there is a specific need to allow integration of the diverse processes, perceptions, experiences, practices and interactions typically involved in learning (pedagogy), construction management (theory/practice) and organisational development (theory/practice). From an exclusivity perspective, the defined research area rests predominantly within the Social Sciences and Management Science domains. Hierarchically, whilst this research is situated within Construction Management Research, it also draws on the fields of Learning, Human Resource Development, Business Strategy and Organisational Development. This research therefore is complex and multi-layered. It exclusively builds on enmeshed theories in order to purposefully develop, validate and test a conceptual model within a construction environment.

At the ontological level, the research adopted a social constructionist position as this allowed for the examination of the construction organisations' structures as well as the social realities created from interactions of the social actors involved. At the epistemological level, this research adopted an interpretive position as the research objectives required the capture of the collective positions and perceptions of the different actors/stakeholders involved in the research domain. The objectives of the research also, to some extent, required the transfer and testing of existing theories and best practices from other domains (behavioural sciences and management science) into the construction domain.

4.3.2 Research Approach Adopted

This research used a mixed-methods approach, applying qualitative and quantitative methods as appropriate to each of the research objectives to be achieved (Bryman, 2016; Silverman, 2010). Combining both qualitative and quantitative methods provided powerful insights (Fellows and Liu, 2015) and brought about a more complete understanding of the complex research context and results that are potentially more useful to practice (Bryman, 2016; Dainty, 2008). Consideration was also given to Dainty (2008)'s argument for holism in construction management research. Combining methodological perspectives (multi-strategy and multimethodology research design) in social science research in construction management was expected to provide a better understanding of the complex network of relationships in industry practice rather than adopting a perspective in isolation which would not have provided the type of insights required (Dainty, 2008). Also by combining both, the weaknesses in each methodology were offset by the strengths in the other (Bryman, 2016; Fellows and Liu, 2015).

4.3.4 Data Collection and Analysis Methods Adopted

On the paradigm "continuum" described by Holt and Goulding (2014), data for the research tends towards the interpretive end being subjective in nature and comprising of measures of attitudes, opinions, behaviours and perceptions. Data collection tools include structured questionnaires, semi-structured interview schedules and tests tending towards positivist paradigms while data collection methods include questionnaire surveys which are positivist and focus group discussions which are qualitative. The data once collected is transformed into numbers and metrics which are analysed and interpreted using quantitative methods (descriptive statistics, relative importance index, and correlation). Qualitative data are analysed using constant comparative analysis. Table 4.13 provides a summary of research methods used for each task in the research.

This section describes the approach used to minimise the main objections to qualitative research methods employed. To reduce subjectivity and improve replicability, interviews were conducted following a largely structured format even though additional questions were asked to further explore or clarify issues raised in the discussions. All interviews were recorded electronically and transcribed verbatim. Interviewees were given the opportunity to correct and confirm transcript and this improved the transparency of the process. Although few cases (3 construction firms) were studied, the cases were carefully selected to obtain a wide spectrum of expert and reliable perspectives allowing for analytical generalisations rather than statistical generalisations.

4.3.5 Ethical Considerations

Ethical considerations in research usually encompass four main principles: protection from harm; informed consent; privacy and confidentiality and deception (Bryman, 2016; Fellows and Liu, 2015; Leedy and Ormrod, 2010; Saunders *et al.*, 2016; Yin, 2014). The methods used in data collection should protect the participants and the researcher from physical or psychological harm, a rule of thumb being that the risk involved in participating in the research should not be appreciably greater than the normal risks of day-to-day living (Leedy and Ormrod, 2010). Linked to protection from harm is the matter of obtaining the consent of participants before involving them in the research. In that respect, participants should be given as much information as possible about the research and the nature of their involvement before obtaining consent for participation Bryman, 2016). Because such information may not be complete before the research commences, participants should have the right to withdraw from the study at any time before the data is included in research reports. Data collected must be treated with care to maintain the privacy of the participants and to protect any personal data they have made available to the researcher. Furthermore, researchers must not misrepresent their work or mislead with their findings.

Although this research has not involved vulnerable persons, care was taken to protect participants from physical and psychological harm by using safe and non-invasive methods of data collection such as questionnaires, self-assessed psychometric tests and semi structured interviews. Participant consent was obtained based on participant information sheets prepared for each stage of the research giving details of the research and the nature of participants' involvement (See Annex 2.1, 2.3, 3.1, 4.3). Data collected was anonymised by not using names but rather assigning codes to participants that are

not linked by any means to their names or job titles. Data collection, storage, transfer and publication meet the confidentiality requirements of the Data Protection Act 1997 (DPA) of the UK by storing data electronically in encrypted files on the University of Central Lancashire secure network until destroyed through the University's secure disposal systems. The University Ethics Committee Reviewed and Approved this research. The approval reference is BuSH 219.

4.4 Research Rationale

The research purpose and overall premise is to investigate construction WLD in Nigeria in order to identify the critical triggers and mechanisms for success; engaging systems, processes and approaches to construction firms' business strategy. The conceptual basis for the development of this approach is that effective and efficient learning and development solutions for construction skills are provided by determining the factors of effective learning and integrating an appropriate mix of factors into a construction firm's learning and development system such that it interfaces seamlessly with the organisation's business.

The main issue was therefore to design an effective learning and development solution for the construction workplace that will efficiently deliver optimal individual worker learning and performances that align with organisational goals. The research employed a five-phase approach. The first phase was an extensive literature review to provide context for the research be examining the factors of effective individual and workplace learning. The second phase characterised the Nigerian construction industry context in relation to the knowledge, skills and attitude (attributes) requirements for effective learning and optimal individual performance, assess the various skills learning

approaches and methods currently used to deliver construction skills learning and to assess the applicability of identified WLD practices to Nigerian construction organisations.

Phase 3 involved in depth case studies in three construction firms in Nigeria to further investigate learning and development from the perspectives of the two units of analysis, the individual worker as learner and the construction organisation as learning and development environment. The learner studies evaluated the effect of the significant learning attributes on performance within the construction workplace context. The learning and development environment studies examined the WLD strategies and practices of the organisation as well as perspectives of management and staff on existing approaches. Findings from Phase three provided the components and domain dimensions for a conceptual construction WLD model that is aimed at optimising individual and organisational performance in line with organisations strategic objectives. Phase 4 populated and refined the maturity model while Phase 5 tested and validated the model.

The research focused on two units of analysis namely: the individual worker as an effective learner situated within the workplace to achieve optimal performance; and the construction organisation creating an appropriate learning environment geared towards achieving its business goals. Findings from each of the units of analysis were integrated into the WLD model using the configuration approach to achieve both vertical and horizontal alignment. See Figure 4.3

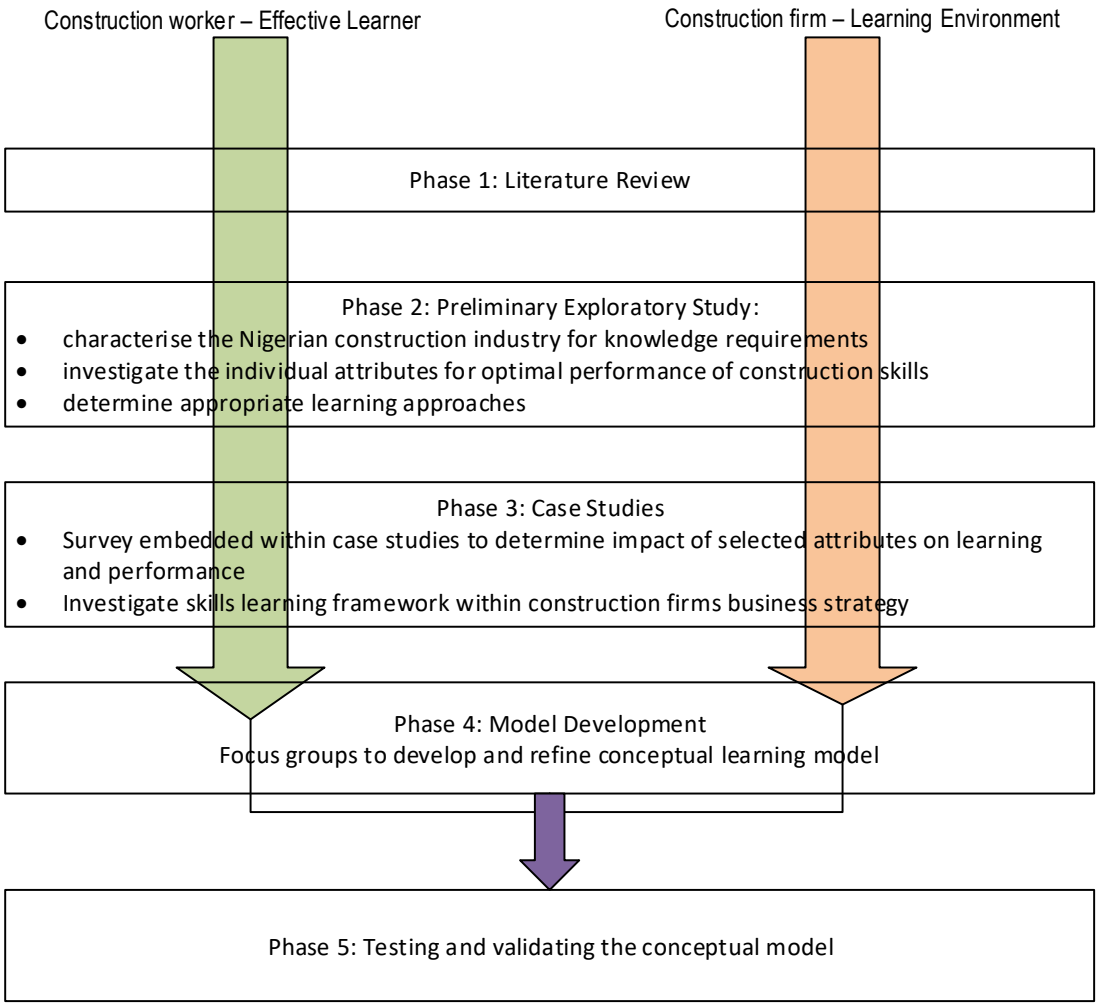

Figure 4.3 Effective learner and the learning environment: Research focus through all phases

4.4.1 The Individual Worker (Learner)

First, the research sought to determine from theory the attributes an individual requires for effective continuous learning that are also related to optimal performance. It was determined that a person requires not only cognitive attributes but also emotional and social attributes to effectively learn on a continuous basis and also for optimal performance. A 'whole person' approach to learning, covering the cognitive, emotional and social dimensions is therefore expected to deliver better effective learning and as a consequence, optimal performance. A generic list of 26 attributes from the three dimensions was identified from extant literature for further investigation.

The need to contextualise these attributes for the construction worker and to reduce the number of attributes to the most significant for further investigations, led to a nationwide survey (preliminary exploratory study) of the perceptions of construction domain experts in Nigeria of the significant attributes of a high performing construction worker they have worked with, a low performing construction worker they have had experience of and their concept of the ideal construction worker. The survey results indicated that technical skill, underpinning knowledge, numerical skills, motivation, creativity, craftsmanship, social skills, communication skills and a business-like attitude were the most significant attributes for optimal performance of construction skills. These nine attributes fit into the model of the 'whole person' approach to learning covering the cognitive, emotional and social dimensions. The preliminary exploratory study also incorporated a second survey of the perspective of construction managers to contextualise for the construction industry in Nigeria the generic list of WLD best practices synthesised from literature.

The premise for the reduction of the study to the most significant was the Pareto Principle which states that roughly 80% of the effect comes from 20% of the causes (Kramp et al., 2016). The rationale was that if construction firms can focus effort on developing the most significant of the required attributes in their workers, improved learning and performance can be achieved more efficiently. This provided the justification for limiting further study to the nine identified significant attributes for effective learning and performance (learner studies) and the 59 WLD key practices (learning and development environment studies). The survey results did not provide evidence that the remaining attributes or best practices were not significant for learning and performance, but they were not investigated further in the research.

Two out of the nine attributes initially selected for this research, technical skill and underpinning knowledge, were dropped from the study because the appropriate methods for measuring the attributes were beyond the scope of this research. A General Mental Ability (GMA) test was conducted to operationalise cognitive ability in place of technical skill and underpinning knowledge. Further studies to empirically determine the relationship between eight selected attributes and performance and the interactions if any between them were carried out.

The measures for the attributes were adapted from various psychological tests that have been used successfully in other domains. The measure for performance was developed from a combination of the perceptions of domain experts on the appropriate criteria for evaluation of performance of construction skills obtained from the results of the pilot study survey and performance measures used in similar studies for other domains. This aspect of the research provided empirical support for construction firms to direct learning experiences at bridging those attribute and performance gaps in their workers that have the potential for maximum effect, and thereby improve effectiveness and efficiency in learning.

The research also sought to determine the various learning approaches that may be most appropriate for delivering the identified significant attributes in individuals within the construction workplace. A variety of approaches were identified from literature covering pedagogical approaches (teaching and learning methods) and the impact of contextual variables such as trainer, learner, and the social and business environment on learning effectiveness. To examine these approaches from the perspective of the construction environment, the perception of the construction domain experts was

sought through the survey (preliminary exploratory study) on the learning approaches considered most effective in the learning of construction skills.

The argument here is that learning efficiency is further improved by mapping the learning content (defined as the identified attribute and performance gaps) to the most effective pedagogical approaches for delivering them in the individual workers. Although the impact of contextual variables on learning effectiveness and efficiency are acknowledged by domain experts, they were not studied further in the research except for the impact of the workplace/business environment on learning.

4.4.2 The Construction Workplace (Learning Environment)

Second, the research sought to provide improved learning and development solutions for construction firms that are based on empirically determined factors of effective learning mapped against effective and efficient learning approaches. To start with, a critical analysis of extant literature of the factors necessary for effective workplace learning to identify the elements of best practice that ensure the appropriate environment for learning effectiveness within an organisation was carried out. This was followed by a survey within the preliminary exploratory studies to contextualise these WLD key practices for the construction organisation domain. The next step was an in-depth study of the case study firms to characterise their WLD environments as a basis for developing a conceptual WLD model.

In summary, the rationale for the research is that when an appropriate mix of the factors of effective learning and performance are integrated with WLD best practices in an organisation such that they interface seamlessly with the manner in which a firm

conducts its business, effective and efficient learning and development is achieved allowing for optimising individual performance of workers and consequently optimising the HR contribution to organisational performance in line with business goals.

The following sections describe and justify the search strategies, research methods, sampling strategies; instruments development methods and data analysis techniques used for each of the phases of the research.

4.5 Literature Review

The literature review covered three main research areas: learning, education and training; the construction industry context; and construction business strategy (see Figure 4.4). An objective of the review was to bring together these three research areas to identify the attributes (knowledge, skills and attitudes) of an ideal intermediate skilled worker in the construction industry context, the appropriate learning approaches that can deliver these attributes within a construction firm while aligning learning with the firm's business strategy.

4.5.1 Literature Search Strategy

A high-level search to capture extant publications in the three identified areas was first conducted to outline previous research in these areas and to identify a set of generic keywords to guide further literature searches (Cronin, *et al.,* 2008; Younger, 2004). The following keywords were obtained for the next level of search: learning; workplace learning; human resource development; human capacity development; business strategy; workforce development; learning organisation; construction industry; and built environment. 'Nigeria' was added as a keyword to provide context. The search

strategy involved combinations of the relevant keywords using Boolean 'AND' searches in electronic databases available at the University of Central Lancashire LIS Discovery Services. The databases searched included: Academic Journals Complete; ERIC; Business Source Complete; CINHAL Complete; PsycINFO; British Education Index; IEEExplore; and the university library catalogue. Searches in Google Scholar provided a complementary source of published work.

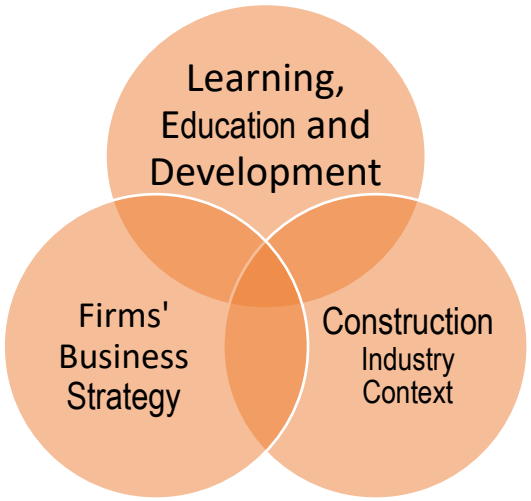

Figure 4.4 Venn diagram of research areas

The search covered peer reviewed academic articles, text books and related unpublished thesis in English. The searches were repeated over the duration of the research to identify and include current related research. Over 3000 articles were retrieved and their abstracts assessed, therefore the review can be considered comprehensive. The searches were complemented with references to other relevant work, author searching, and checking of citation information to expand review backwards and forwards. The two main online sources used to collect articles were Ebscohost and Google Scholar. Within Ebscohost the following databases were selected for the comprehensive search: Academic Source Complete; Business Source Complete, ERIC, Humanities International Complete; PsycARTICLES and SocINDEX. Related full text

papers in peer reviewed journals in English were included. These were complemented with references in the papers to other work; author searching; and checking citation information to expand review backwards and forwards. Figure 4.5 is a mind map of the literature reviewed showing the linkages between research areas. A critical analysis of the extant literature identified the following constructs and sub-constructs for further study:

- *Nigerian construction industry:* production processes and impact on knowledge requirements; and the supply of construction skilled workers to the industry pool by various education/training providers.
- *Individual worker learning processes:* The learning process; learning theories; individual attributes *(*cognitive, emotional, and social) required for effective learning and performance; learning variables; performance management
- *Construction organisation workforce development framework:* strategic HRD; workplace learning and development; learning environment; pedagogical approaches and resources; and workforce development

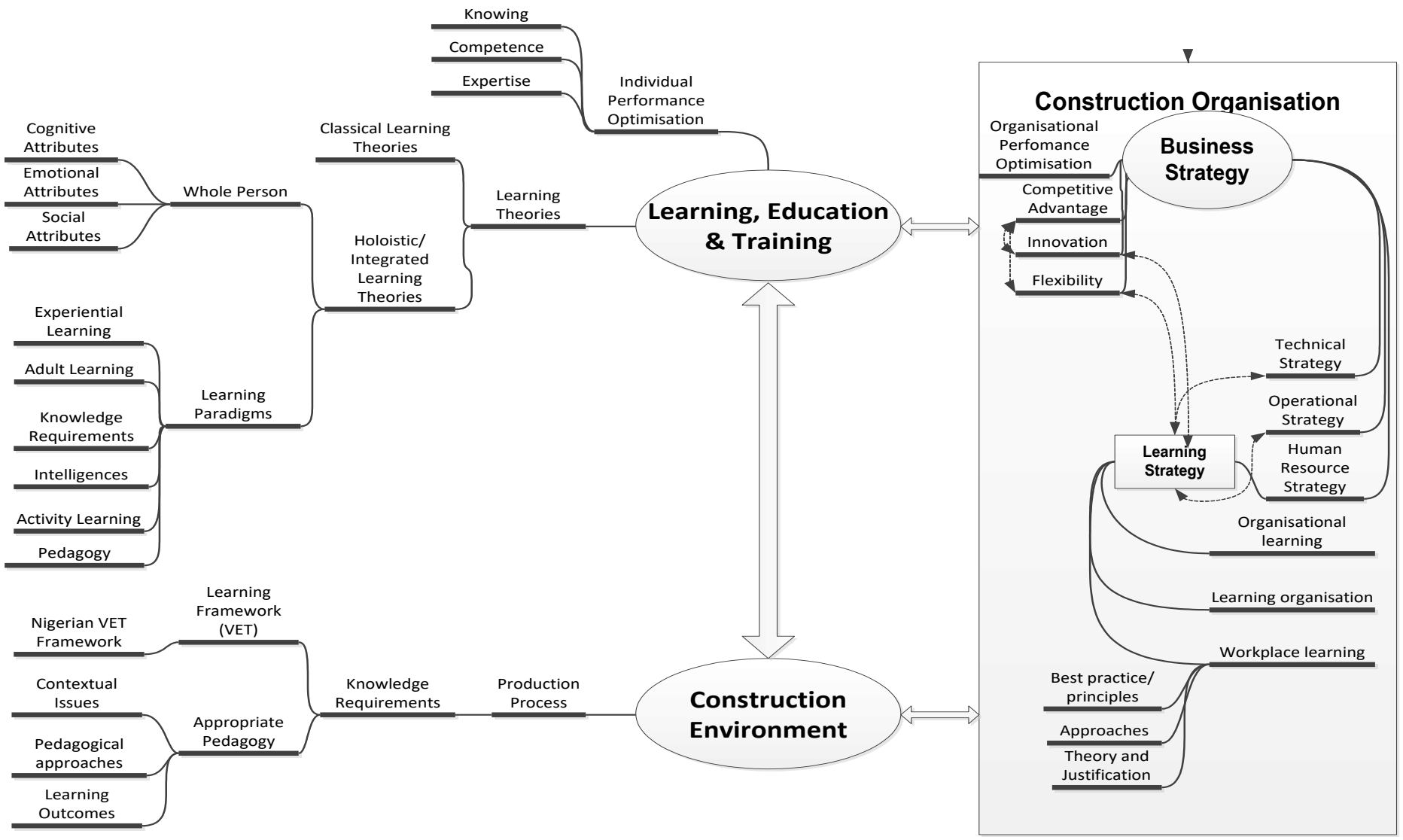

Figure 4.5 Mind map of literature review

4.6 Preliminary Exploratory Study

The Preliminary Exploratory Study (Phase 2) was based on the literature review and was carried out in two parts. One part sought to characterise the construction environment in Nigeria with respect to knowledge requirements and the supply systems for construction skilled workers; to identify the significant individual attributes required for effective learning and optimal performance; to establish the appropriate approaches and contexts for the learning of construction skills; and to establish industry perception of the appropriate criteria for evaluating the performance of construction skilled workers. A questionnaire survey was carried out to capture and synthesise the perceptions of domain experts on the determinants of learning, education and training that effect performance with respect to construction skilled workers in Nigeria. The domain experts included licenced architects, builders, civil engineers, quantity surveyors, construction managers, site supervisors and educators and trainers in construction skills.

The second part sought to capture construction organisation perspectives on the key elements for WfD success. Participants were asked to rate for significance, each of the key elements that contribute to construction WfD success. The participants were construction contractors who are registered members of the FOCI in Nigeria.

Questionnaire surveys were considered the most appropriate tools for data collection due to the large sample sizes and their spatial dispersion across Nigeria (Leedy and Ormrod, 2010). Nigeria covers a land area of 923, 770 km^2 (World Bank, 2015).

4.6.1 Survey A - Individual Worker Learning

4.6.1.1 Questionnaire A Development

The individual worker learning questionnaire developed for data collection comprised a total of 195 items subdivided into 6 sections as indicated in Table 4.1. The questions were simple and most allowed for a single tick as response. Farrar and Trorey (2008) note that one way of understanding expertise may be to study the characteristics of those considered to be experts in their vocational field. The strategy for this aspect of the research was therefore to survey construction domain experts' perceptions of the personal attributes evident in the job performance of high performing construction workers and low performing construction workers they have worked with. Furthermore, to elicit domain experts' perceptions of the personal attributes considered important for job performance of their concept of an ideal construction worker.

Consequently, development of the questionnaire for this aspect of the research followed a constructivist approach and questions were designed to encourage participants to think about the answers they were giving and to elicit a consensus of perceptions on the significant learning attributes using a variety of methods. For instance, to determine the most significant attributes for performance of construction skills, participants were asked to identify, from a randomised generic list of 26 personal attributes, the ten most significant attributes of the following three categories of workers: a high performing intermediate skilled worker they have known; a low performing intermediate skilled worker they have known; and their idea of an ideal intermediate skilled worker. Participants were asked to rank and rate the selected attributes for each category of worker using a 4-point scale (4 = strongly agree, 3 = agree, 2 = disagree, and 1 = strongly disagree).

Eight items measured perceptions of industry character with respect to knowledge requirements on a 4-point Likert scale, 10 items assessed perception of contribution of construction intermediate skilled workers to industry pool by 10 categories of education and training providers in terms of frequency (using a 4-point Likert scale) and quality (using a 10-point scale). 55 items rated learning approaches and contextual issues for learning effectiveness on a 4-point Likert scale.

The 10 most effective teaching methods for construction skills were also identified, then ranked, and scored (using a 5-point scale) from a list of 15 generic methods while the 10 most significant criteria for evaluating performance were identified, then ranked and rated (using a 4-point Likert scale) from a generic list of 12 criteria. At the end of each section, the experts were given the option of adding other appropriate criteria not included in the generic lists.

This research takes the view that a well-designed Likert scale exhibits symmetry and balance. Symmetry in the sense that the scales contain an equal number of positive and negative positions and balance in the sense that the distance between each position has the same value allowing for quantitative comparisons such as averaging to be valid across items containing more than two positions. Typically, 5-position levels are used although for some types of research, seven and nine may be considered appropriate. However, the Likert scale employs a bipolar scaling method measuring either a positive or negative response to a statement. An even-point scale is used where the middle neutral option is not available or inappropriate. This is sometimes referred to as a "forced choice" method.

Table 4.1 Questionnaire (Part A) structure outline

Section	**Sub sections**	**Items**	**Total Items**	**Type of scale**
Construction Environment	General	3		
	Knowledge requirements	8		4-point scale
	Training provision (frequency)	10		4- point scale
	Training provision (quality)	10		10-point score
			31	
Attributes for performance	High performing worker	26 (3)		4-point scale
	Low performing worker	26 (3)		4-point scale
	Ideal worker	26 (3)		4-point scale
			78	
Effective learning contexts	Conditional	1		Yes or No
	Basic knowledge, motivation, age, class size, trainer	55		4-point scale
			56	
Effective teaching methods		15		5-point score
			15	
Performance evaluation criteria		12		4-point scale
			12	
Demographics	Geographical area of operation	1		
	Gender	1		
	Age	1		
			3	
TOTAL			**195**	

The neutral option is sometimes treated, by participants, as an easy option when unsure and this becomes problematic considering it could be either a true neutral position or an unsure one. Furthermore, there is the question of what value to assign to the neutral position, a zero or a mid-point value? Coolican (2014) considers the undecided score ambiguous as it could imply no opinion or an on the fence opinion with the participant torn between both directions. This would then create difficulties where overall scores central to the distribution could reflect a lot of undecided answers or a collection of strongly for and strongly against answers in which case the scale would be measuring two different attitudes.

Leung (2011) found that there was no major difference in the internal structure in terms of means, standard deviations, item-item correlations, item-total correlations, Cronbach alpha or factor loading of 4- 5-, 6-, and 11-point Likert scales. Leung (2011)'s findings also indicated that having more scale points seemed to reduce skewness and that the 11-point scale ranging from 0-10 had the smallest kurtosis and was closest to normal. Arguments against the 11-point scale include that with so many scale points more effort and hence fatigue may be entailed in choosing one item. Leung (2011), however, counter argues that people are used to the 10- and 100- point scales and that empirical studies have not supported the fatigue argument.

This phase of the research was exploratory in nature and was aimed at identifying general trends that will outline and shape further in-depth studies; a 4-point scale was considered appropriate for some aspects of this research. An additional consideration for removing the neutral option was that participants were all experts in the construction domain and as such were expected to have definite opinions about the

subject under study. A 5-point scale was introduced to provide variety in one segment of the 195-item questionnaire to reduce participant fatigue and disinterest. A 10- point scoring was also introduced for the assessment of quality of learning provision for the same reasons but also because it was more appropriate for the question asked. A sample of Questionnaire A (Annex 2.1) can be found in the Appendix II to this thesis.

4.6.1.2 Population

Licenced architects, builders, civil engineers, quantity surveyors, construction managers, site managers, site supervisors and educators and trainers in construction skills were considered experts in this domain in the sense that they would have worked with construction intermediate skilled workers in a supervisory capacity. They were therefore considered competent to analyse the performance of construction workers in order to determine the contributing factors. A comprehensive database of each of these experts was obtained from the various regulatory bodies for each group.

The regulatory bodies for architects, builders, civil engineers, and for quantity surveyors are agencies of government who license professionals to practise after rigorous prequalification processes. The qualification process commences after completion of a construction related undergraduate degree or Higher National Diploma (HND) and a period of structured training under a licenced professional. The process includes a series of professional competence written examinations and interviews at two levels (professional body and regulatory body).

The Federation of Construction Industry (FOCI) is an umbrella body for building and engineering construction contractors operating in Nigeria. FOCI provide a platform for

creating standards, collective bargaining, representation and facilitation for the contractors (FOCI, 2017). FOCI is recognised by the Nigerian government as the representative body for construction contractors in the country. FOCI membership is made up of construction firms who employ at least 100 persons on a full time basis. More importantly for this research, FOCI maintain a current (2014) directory of members. The FOCI directory therefore provided the database for this research for construction contracting organisations in Nigeria. A total of 73 construction contracting firms were registered with FOCI at the time of the study. The research estimated that at least 7% of the 100 employees will be employed as construction/site managers and supervisors totalling an estimated population of 511 persons.

The population for educators and trainers in construction skills were made up of instructors in polytechnics and technical colleges in carpentry, plumbing, bricklaying, concreting, masonry, tiling, soil testing, painting, welding and metalwork. Comprehensive lists of polytechnics and technical colleges offering construction skills courses were obtained from NBTE and NABTEB respectively. Table 4.2 shows the population of the study comprising the databases of the domain expert groups.

4.6.1.3 Sampling Method

A proportionate stratified random sampling method was used to select the domain experts drawn from construction firms, professional groupings (architects, builders and engineers) and educational institutions (educators and trainers). Stratified sampling is a probability sampling technique in which a finite population (N) is first divided into subpopulations (strata) and then random sampling techniques are applied to each stratum.

Table 4.2 Database of domain expert groups in Nigeria

Domain Expert Groups	Description	Target Participants	Population
Construction firms	FOCI	Construction managers, site supervisors	511 (estimated)
Professional groups	Architects Registration Council of Nigeria (ARCON)	Registered Architects	2515
	Council for Registered Builders of Nigeria (CORBON)	Registered Builders	1708
	Council of Registration of Engineers in Nigeria (COREN)	Registered Civil, Electrical and Mechanical Engineers	7808
	Quantity Surveyors Registration Board of Nigeria (QSRBN)	Registered Quantity Surveyors	1583
Educational Institutions	NABTEB Regulated Technical Colleges	Educators and trainers	660
	NBTE Regulated Enterprise Institutions	Educators and trainers	20
TOTAL			**14,805**

In proportionate sampling, the sample size (n) is selected from the population such that:

$$n_h = n\frac{N_h}{N} \qquad \text{and} \qquad \sum_{h=1}^{H} n_h = n.$$

Where,

N = Population size

N_h = Size of the h^{th} stratum

n = Total sample size

n_h = Sample size for the h^{th} stratum

Subsequently, simple random sampling or systematic sampling is applied within each stratum. Proportionate stratified sampling is therefore essentially stratified random sampling with proportionate allocation. The purpose was to obtain a sample that

resembles as closely as possible the population from which it was drawn (Leedy and Ormrod, 2010; De Vaus, 2014; Bryman, 2016). The technique improves representativeness of the resulting sample by reducing sampling error. Table 4.3 shows the target sample sizes by strata. To optimise the response rate, questionnaires were hand delivered to offices of those experts in the sample and responses were also collected by the same means.

4.6.1.4 Sample size and distribution

Table 4.3 presents the sample size and distribution of participants for Questionnaire Survey A.

Table 4.3 Sample distribution

	Population	**Sample Size**	**Percentage of Strata Size to Population**
Construction Manager	219	14	1.48
Architect	2515	168	16.99
Builder	1708	114	11.54
Civil Engineer	6528	434	44.09
Quantity Surveyor	1583	106	10.69
Site Supervisor	292	21	1.97
Educator/Trainer	680	45	4.59
Electrical Engineer	640	43	4.32
Mechanical Engineer	640	43	4.32
Procurement Manager			0.00
Total	14,805	988	100.0%

4.6.1.5 Area of coverage

The survey area covered one central location in each of the six geographical areas in Nigeria, specifically, South-West (Lagos); South-East (Enugu); South-South (Port Harcourt), North-Central (Abuja); North West (Kaduna); North-East (Bauchi). Figure 4.6 is a map of Nigeria showing the six geopolitical zones.

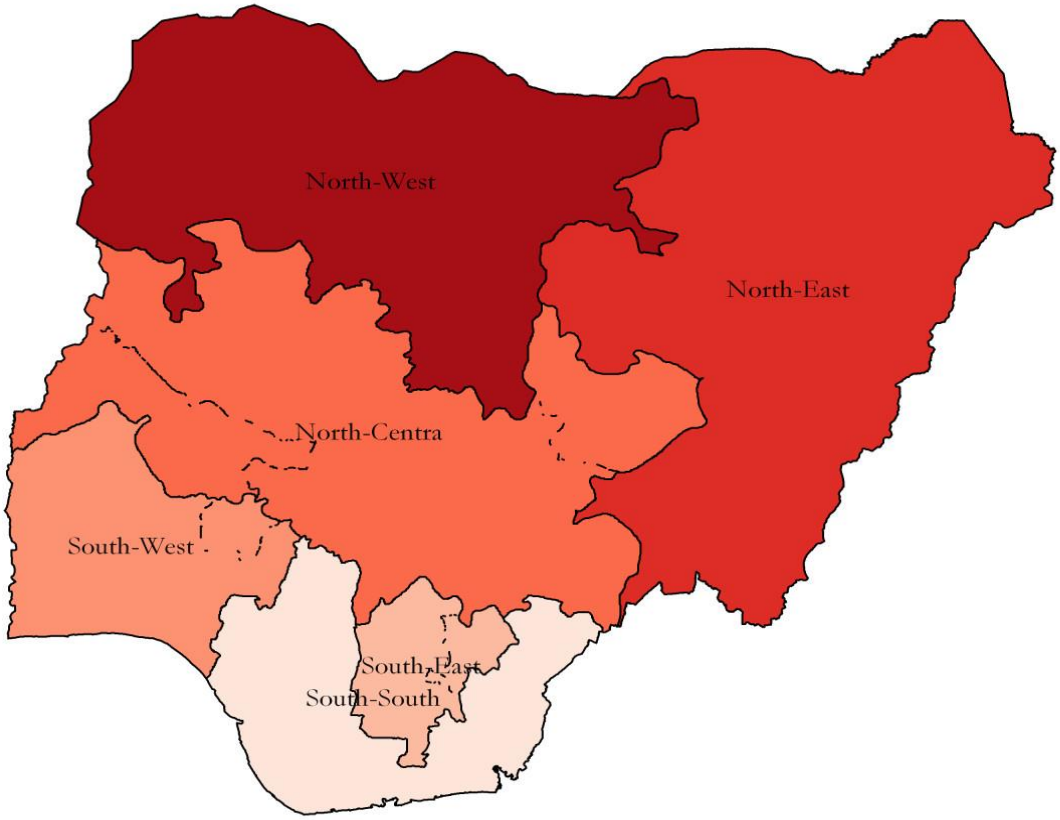

Figure 4.6 Map of Nigeria showing six geopolitical zones

4.6.1.6 Data Analysis

Data was analysed using descriptive statistics. Standardised average ratings and average scores were used to determine the relative importance of each individual worker attributes for learning and development. To determine domain expert perceptions of construction industry character in relation to knowledge requirements, the 8 items in this section of the questionnaire were analysed using descriptive statistics. Mean,

median and modal ratings were calculated using SPSS for each of the 8 items. Calculating the mean ratings was considered appropriate because the data were assumed to be normally distributed based on their normal Q-Q plots. Data also showed acceptable internal consistency (Cronbach α = 0.789). The Cronbach Alpha is a commonly used statistic for estimating a test's reliability (Coolican, 2014; De Vaus, 2014).

Class or group interval is calculated by dividing the difference between the maximum possible score and the lowest possible score by the number of groups. For instance, for the 4-point Likert scale, where the highest score is 4, the lowest score is 1 and the number of groups is 4 (strongly disagree, disagree, agree, strongly agree) the scale was calculated as ¾ = 0.75 given the 4-point Likert scale used for this section of the questionnaire. Accordingly, group interval values were worked out as recorded in Table 4.4. (Narli, 2010)

In the same vein, domain expert perceptions with respect to the quantity of skilled workers supplied by each of the ten identified training providers to the construction industry was analysed using descriptive statistics. Mean, median and modal ratings were calculated using SPSS for each of the ten items. Calculating the mean ratings was considered appropriate because the data were deemed to be normally distributed based on their normal Q-Q plots. Data also showed acceptable internal consistency (Cronbach α = 0.736). Table 4.4 records the applicable group interval values (Narli, 2010).

Table 4.4 Group boundary values

Interval boundary value	**1.00 -1.75**	**1.76-2.50**	**2.51-3.25**	**3.25-4.00**
Knowledge requirements group	Strongly disagree	Disagree	Agree	Strongly agree
Quantity of skills provision group	Rarely	Sometimes	Usually	Always

4.6.2 Survey B - Construction Organisation Environment

4.6.2.1 Questionnaire B Development

The construction organisation questionnaire comprised of a total of 71 items as follows: 66 of the items were the WLD key elements and participants were required to rate each of them for significance on a 4-point Likert scale; 1 open ended question where participants were required to include and rate any additional key elements that in their opinion was omitted from the generic list provided; and 4 items elicited responses that described the demographics of the sample. Annex 2.2 in Appendix II is a copy of the questionnaire employed for the construction organisation part of the preliminary exploratory survey.

4.6.2.2 Population

The survey was designed to determine the workforce learning and development practices pertinent to construction organisations. Construction organisations workforce development systems were therefore the units of analysis. The research took the view that managers within construction organisation were best positioned to assess the significance and impact of each WLD practices as the basis for designing a robust learning and development system for organisations. The organisations making up the population to be studied needed to have HR systems and processes that were to some

extent defined, a reasonable number of full time employees, and have been in operation long enough in Nigeria to have gone through a cycle of worker recruitment and development. The Directory of the Federation of Construction Industry currently provides the only list of contractors that meet the requirements of the research, and these contractors therefore form the population of this research.

4.6.2.3 Sampling method

The Directory of the FOCI has 73 construction contracting organisations listed as full members. Total population sampling was selected for this aspect of the research because of the small population size. Total population sampling is a purposive sampling technique where all the members of the population of interest are studied. This ensures wide coverage and reduced risk of omitting potential insights. However, with total population sampling, sampling error is magnified if response rates are low. An electronic copy of the questionnaire was sent to each of the construction firms in the population using their published contact email addresses. To improve response rate, a hardcopy of the questionnaire was also hand delivered to the construction firms' offices in Lagos, Abuja, Enugu, Port-Harcourt and Kaduna with covering letters as reminders.

4.6.2.4 Data analysis

Data was analysed using descriptive statistics. Standardised average ratings and average scores were used to determine the relative importance of each key element of workplace learning.

4.7 Multi-Case Study

4.7.1 Case Study Design

This research took the view that skills are features of the workplace as a social system rather than just features of individuals or jobs (Stasz *et al.*, 1996); that learning and performance on the job are integrated within a workplace context and are therefore better studied holistically as parts of a complex social system The in-depth study of the relationships and interdependencies between individual attributes, individual performance, workplace learning best practice and organisational performance while aligning with business goals was therefore best carried out within the context of the construction organisation. The complexity of systems characterised by a large number of variables interacting within variable contexts requires the in-depth study techniques that case study research designs provide. Consequently, the case study research design was considered the most appropriate for this research. The case study design allowed for an in-depth investigation of learning in the real-world context of the workplace (Baxter and Jack, 2008; Eisenhardt, 1989; Yin, 2014). The method was found to be flexible and rigorous, supporting the use of a variety of data sources which allowed for a holistic view of the phenomena (Baxter and Jack, 2008; Yin, 2014).

A multiple case design was used because evidence from multiple cases was expected to be more compelling and more robust than a single-case design in the same manner as multiple experiments (Yin, 2014). The research therefore utilised a case study approach carried out within three selected construction contracting firms, one large (CS1), one medium (CS2) and one small (CS3) construction firm. Within each case study, the earlier identified two units of analysis, the construction skilled workers (effective learner) and the construction firm (learning environment) were maintained in line with the two

research threads outlined in section (4.1.1). The case studies adopted the pragmatic approach employing both qualitative and quantitative methods of data collection and analysis to bring together the multiple perspectives of reality in order to provide a full picture of workforce learning and development within the complex context of the construction workplace (El-Dirarby 2012; Creswell, 2013; Dainty, 2008; Kelemen and Rumens 2012; Niglas, 2010).

For each case, multiple sources of evidence are used to provide construct validity. For instance, the individual worker learner involved quantitative assessments of the selected individual attributes of individual performance representing a positivist approach embedded (nested) within each case forming the multiple case study research design (Baxter and Jack, 2008; Yin, 2014). A report was written for each case where findings were based on the convergence of evidence as shown in Figure 4.7. The result was the embedded case study design shown in Figure 4.8.

The variety of data sources, both quantitative and qualitative, ensures that all facets of the cases are revealed. Cross case syntheses were carried out between the case reports with analyses and explanations of the similarities and differences in findings, allowing for analytical generalisations rather than statistical generalisations (Yin, 2014). The convergence of evidence helped to strengthen the construct validity of the case study. These together provided deeper insights into the development of skills in the construction workplace.

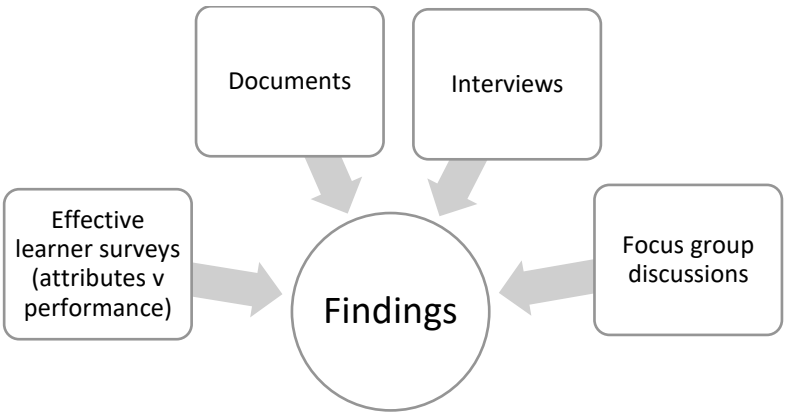

Figure 4.7 Convergence of evidence

4.7.2. Selection of Case Study Organisations

4.7.2.1 Sampling Method

A purposive sampling approach was used to select the case study construction firms. Purposive sampling is a non-probability sampling technique where the cases to be investigated are selected based on the researcher's judgement (Neuman, 2006; Silverman, 2010). The purpose was not to randomly select from a population to provides basis for generalisation, but rather to focus on characteristics of the population that are of interest in achieving the research objectives (Matthews and Ross, 2010; Patton, 2015). The rationale for selection was therefore to select information rich cases that would provide insights and in depth understanding of issues of WLD within the construction workplace context (Patton, 2015). To this end, three construction contracting firms were selected based on long years of operation in the Nigerian construction environment. These firms have gone through several cycles of workforce recruitment, development and disengagement and therefore have had the opportunity to develop and establish systems of WLD. In addition, over the years, the firms have drawn from the same pool of construction workers and would have developed experience and insight in dealing with construction workforce challenges being subject

to similar socioeconomic pressures inherent in the “boom and bust” cycles of construction activity.

One large (CS1), one medium (CS2) and one small (CS3) construction contracting firms made up the sample. Each of the firms was carefully chosen for the in-depth study to provide theoretical replication rather than literal replication in the sense that contrasting results can be predicted but for anticipatable reasons. Three other construction firms, one large (TV1), one medium (TV2) and one small (TV3) construction firms were selected for testing and validation of the model. Typically, the differences in characteristics of small firms and large firms that may prove to be challenges for WLD are outlined in Table 4.5. Characteristics of a medium sized firm are expected to lie somewhere in between.

The strategy for purposive sampling in selecting the three case study construction firms was a combination or mixed purposive sampling in the sense that it combines aspects of theoretical, criterion and typical sampling strategies to ensure an in-depth study of the research domain area (Benoot, *et al.*, 2016; Suri, 2011).

4.7.2.2 Definition of Large, Medium and Small Construction Firms

There is no single definition of small, medium and large enterprises (Bauchet and Murdoch, 2013; Kamal and Flannagan, 2014; Lu, *et al.,* 2008; Miller, *et al*., 1998). Clancy and McQuaid (2000) identified two main approaches for defining small and medium scale enterprises: quantitative and qualitative. Quantitative approaches include number of employees (Bauchet and Murdoch, 2013; Clancy and McQuaid, 2000; Commission of the European Communities, 2001; Ebitu, *et al.,* 2016; Kamal and

Flannagan, 2014; Miller, *et al*., 1998; National Council on Industry, 2001; National Policy on MSMEs, 2006; Seeley, 1997), annual turnover (Clancy and McQuaid, 2000; Commission of the European Communities, 2001; Kamal and Flannagan, 2014; Lu, *et al.,* 2008; Miller, *et al.,* 1998), and asset size (Bauchet and Murdoch, 2013; Clancy and McQuaid, 2003; Ebitu *et al.,* 2016; National Council on Industry, 2001; National Policy on MSMEs, 2006) and these vary by industry and country.

Qualitative approaches to classifying organisations as small, medium or large include management or ownership structure of the organisation (Clancy and McQuaid, 2003; Lehn *et al*., 2004, Miller *et al*., 1998), geographical area of operation (Ebitu *et al.*, 2016; Seeley, 1997).

Table 4.5 Characteristics of large and small firms

Large	**Small**
Long-term orientation	Short-term orientation
Predictive and planned business activity	Reactive and unplanned business activity
Annual budgetary planning	Weekly cash flow
Control/governance via board of directors	Dominance of owner/manager
Bureaucratic/hierarchical	Flatter, employee closer to the boss
Professional mangers	Business people
Likely to have HR specialists	Unlikely to have HR specialists
More likely to have a trade union	Less likely to have a trade union

Source: Griggs and Holden (2013)

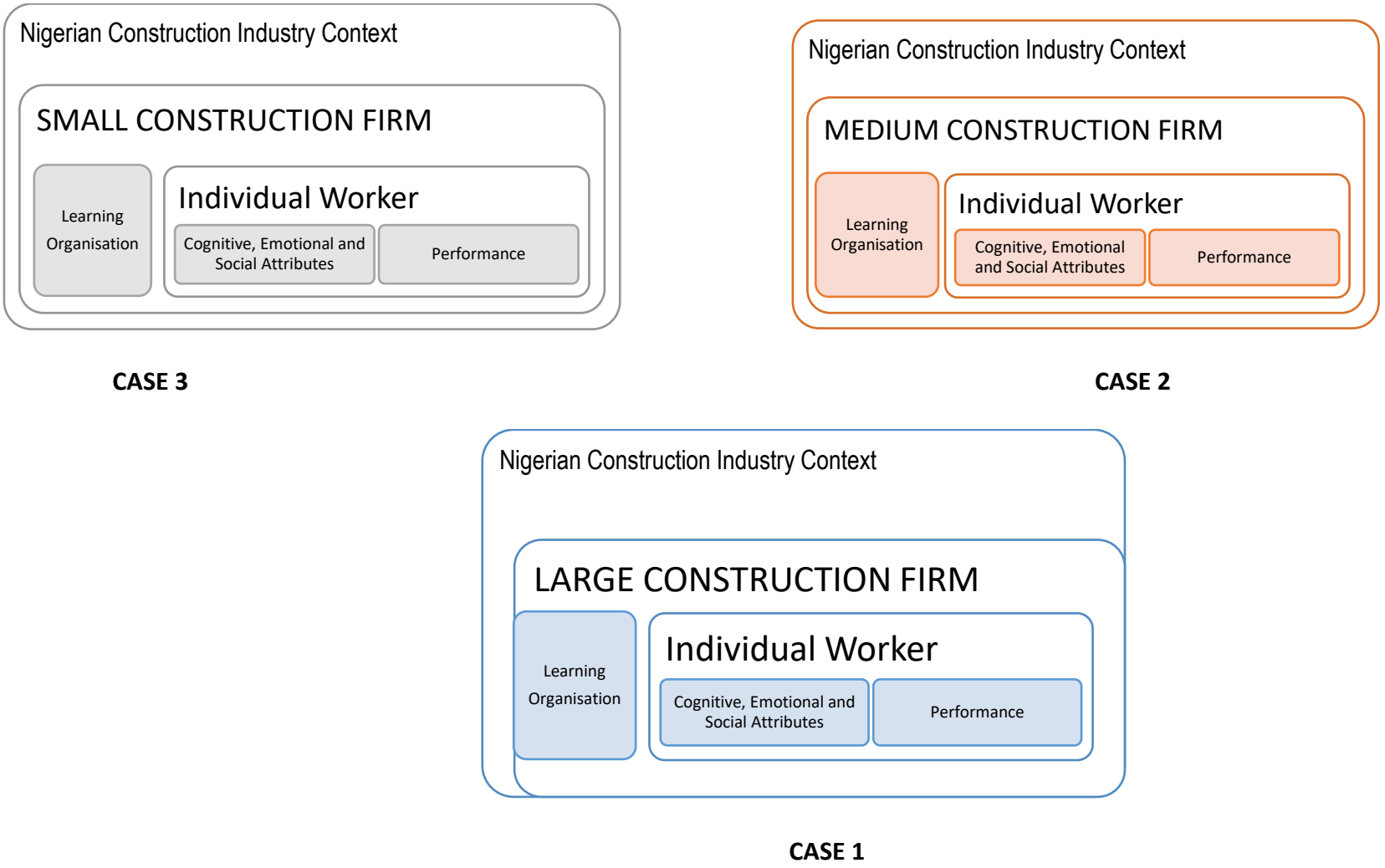

Figure 4.8 Mixed methods nested arrangement comprising two separate but interrelated studies within each case study

In Nigeria, the classifications commonly adopted are from the National Council on Industry (2001) and the National Policy on Micro, Small and Medium Enterprises (FGN, 2006). This research uses the National Council on Industry (2001) classification which is based on number of employees and asset base (including working capital but not land). Micro/Cottage industries employ 10 workers or less and have an asset base of N1.50 million or less. Small scale industries employ 11-100 workers and have an asset base of N 1.50 million to N 500 million. Medium scale industries employ 101-300 workers and have an asset base of N 50 million – N 200 million. Large scale industries employ over 300 workers and have asset bases of over N 200 million. Where there is conflict, number of employees take precedence as classifier mainly because the asset base criterion is considered less reliable because it is affected by currency fluctuations.

Moreover, obtaining authentic values for the asset bases of construction firms in Nigeria is problematic. The research therefore used other qualitative criteria such as management/control structure and geographical area of operation to confirm construction firm size. According to Seeley (1997) and Druker and White (1996), small construction firm operations are usually local and within reasonable distance from head office. Medium firm operations are regional, while large firms undertake contracts nationally and even internationally. The research selected one firm in each category that was representative of the group. Table 4.6 details characteristics of each of the selected firms that typify them as small, medium and large construction firms.

Table 4.6 Characteristics of case study firms

	Number of board members	Size of full-time workforce	Number of years in business in Nigeria	Classification by size of workforce
CS1	8	3000	40 years	Large
CS2	4	250	25 years	Medium
CS3	1	25	30 years	Small
TV1	9	1500	20 years	Large
TV2	4	100	15 years	Medium
TV3	1	20	15 years	Small

4.7.2.1 Large Construction Firm (CS1)

4.7.2.1.1 Profile

Case Study 1 (CS1) is a large construction firm in Nigeria established in 1976. Although current (February, 2015) full time employee figures stood at over 3000, this figure represents a drastic drop from 6000 employees in 2014. The drop has been attributed to a slowdown in construction activity in Nigeria usually associated with general election periods. The firm operates in all the geographical areas of Nigeria and its scope of operations include complex civil engineering and building projects.

4.7.2.1.2 Strategic Direction

The key strategic issues for the firm are: expanding firm's market to include construction work in the oil and gas sector; working towards ISO 9001: 2008 certification, as a requirement for construction work with international clients; and restructuring for commercial viability of each small business unit (SBU) within the organisation.

4.7.2.1.3 Workforce Development Challenge

The firm is currently building up competence and capacity to align with ISO 9001: 2008 certification requirements in order to carry out heavy engineering works in the oil and gas sector in Nigeria and neighbouring countries. WfD is therefore a primary concern. Current approaches to WfD comprise formal and informal practices. The training department is situated in the HR division and comprises of two members of staff. The organisation contributes a levy to the Industrial Training Fund (ITF) and therefore benefits from training programmes organised by ITF. ITF training programmes are generic and not tailored in any way towards specific organisational needs. These training programmes are usually conducted outside the firm and nominated workers have to leave work for the duration. Construction plant manufacturers and vendors also routinely provide training when new plant is purchased by the organisation.

Occasionally, individual workers are sent on training programmes outside of the organisation if they can justify that it will be of benefit to the organisation. WfD programmes appear to be decided on an ad hoc basis. There appears to be no system for determining knowledge, skill and attribute gaps in the organisation. Learning from these programmes is not evaluated, neither is it captured, documented or retained by the organisation.

4.7.2.2 Medium Construction Firm (CS1)

4.7.2.2.1 Profile

Case Study 2 (CS2) is a medium sized construction firm in Nigeria employing over 300 employees on a permanent basis. The firm which was established in 1991 currently

operates in three out of the six geographical areas of Nigeria and its scope of operations include civil engineering and building projects.

4.7.2.2.2 Strategic Direction

Key strategic issues for the firm are to: grow to be a large player in the Nigerian construction industry; expand firm's market to include construction work in the oil and gas sector; work towards ISO 9001: 2008 certification as a requirement for construction work with international clients; and to restructure small business units (SBUs) within the firm to be self sustaining.

4.7.2.2.3 Workforce Development Challenge

The firm is currently building up competence and capacity to align with ISO 9001: 2008 certification requirements in order to carry out construction works in the oil and gas sector in Nigeria and Sao Tome and Principe.

4.7.2.3 Small Construction Firm (CS1)

4.7.2.3.1 Profile

Case Study 3 (CS3) is a small construction firm in Nigeria employing less than 25 employees on a permanent basis. The firm currently operates in three geographical areas of Nigeria and its scope of operations cover a wide range of buildings projects of various sizes and levels of complexity.

4.4.2.3.2 Strategic Direction

Key strategic issues for the firm are to provide an excellent personalised service and to grow to be a medium sized construction firm.

4.4.2.3.3 Workforce Development Challenge

The firm relies on a core of staff trained by the firm on-the-job over the years. WfD is informal and is directed at the current needs of the job. Just in time training is provided by more experienced managers and workers. On occasions where expertise for a task does not exist in the firm a worker is selected and sponsored for training with a component supplier or with another firm on a construction site.

4.7.3 Psychometric Assessments

To understand the impact of significant individual attributes on construction worker learning and performance within the context of the construction workspace, the research investigated the relationship between nine personal attributes (independent variables) and performance (dependent variable). The attributes in focus and individual job performance were unbundled and investigated for correlation. Purpose-made scales were developed to operationalise creativity, craftsmanship, social skill, communication skill, and business-like attitude. Development of these five scales followed the same format which is now briefly described.

The rationale for each measure is first presented clearly stating the behaviours to be measured, subscales where applicable and basis for inclusion. The method of scale development draws on the Messer and Harter (2012) manual used in developing a self-perception profile questionnaire for adults. Each questionnaire was given the title "What am I like" and included a statement that there are no right or wrong answers but that each participant should pick the type of adult that is most like them. The question format was forced-choice on a four-point scale. Two statements were made per item in a way that suggested that half the people in the world are associated with each

statement. Participants decide which half they belong to and also decide their degree of association to the type by checking either the “sort of true for me” or the “really true of me” option. The belief is that this design will offset the tendency to give socially desirable responses (Messer and Harter, 2012). A sample question is presented in Figure 4.9.

Actually True for me	**Somehow True for me**				**Somehow True for me**	**Actually True for me**
☐	☐	Some people will attempt to solve problems that in principle have no solution	**BUT**	Some people will not attempt to solve a problem that has no apparent solution	☐	☐

Figure 4.9 Sample question

4.7.4 Construction Organisation Context

For the construction firm, the research analysed the existing learning system within the organisations and evaluated them in relation to WfD best practice determined in Phase 2 (Preliminary Exploratory Study) of the research. To enable an in-depth study of the complex domain. Phase 3 and 4 utilise a case study approach carried out within three selected construction firms, one large (CS1), one medium (CS2) and one small (CS3) construction firm. The contracting firms were carefully chosen to provide theoretical replication rather than literal replication in the sense that contrasting results can be predicted but for anticipatable reasons (Yin, 2014). The multi-case studies are expected to improve robustness in the same manner as multiple experiments (Yin, 2014).

Phase 3 involved the investigation into the relationships between the individual personal attributes (selected from Phase 2) and individual performance to establish correlations and interactions that will underpin performance optimisation solutions for model development in Phase 4. Phase 3 also analysed the firms learning systems to establish effectiveness in relation to identified workplace learning best practice. Phase 4 pulled in both threads in phase 3 to design the conceptual skills learning model. Phase 5 tested and validated the conceptual learning and development model within three other construction firms to confirm validity, functionality and replicability. The following three sub-sections describe the case study firms.

4.8 Effective Learner Studies (Phase 3)

This aspect of the study covers research objective 4 which is to examine the relationships and dependencies between intermediate skilled worker attributes and individual performance in order to establish significance and impact. Findings from the individual worker part of the preliminary exploratory study formed the basis for selecting the attributes that were studied at this stage and they are: cognitive attributes (technical skill, underpinning knowledge and numeracy skills); emotional attributes (motivation, creativity and craftsmanship); and social attributes (social skill, communication skills and business-like attribute). Two attributes, technical skill and underpinning knowledge were dropped from the research at this stage because the appropriate tests for assessing technical skill and underpinning knowledge were beyond the scope of this research. Consequently, a general mental ability test was conducted to operationalise cognitive skill. The attributes in focus as well as individual job performance were unbundled and investigated for correlation.

This bipolar scaling approach did not allow for a neutral position because the participants were expected to describe themselves in relation to the attributes under study. Appropriate questions for each subscale were selected from various psychological tests that have been used successfully in other domains (Ferris *et al.*, 2001; Kline, 2000; Messer and Harter, 2012; Queendom, 2015).

A pilot of the instruments was conducted among National Diploma students of architecture, building and quantity surveying in a polytechnic in Nigeria. The pilot addressed issues in questionnaire development with respect to ambiguities in wording, any misleading questions, inappropriateness, varieties in responses, meaning, and any incidences of non-response and redundancies. The scales were also evaluated for flow, question skip, timing, and participant interest and attention. 55 students participated in the pilot. Responses helped to shape and refine the scales and the wordings of the questions. The following four sections describe the development of the instruments used in this part of the research.

4.8.1 Cognitive Attributes Measures

4.8.1.1 Numeracy skill

Numeracy skill is operationalised as the participant's latest score in mathematics in an external examination. External examinations such as Senior Secondary Certificate Examination (SSCE), Junior Secondary Certificate Examination (JSCE) and the National Technical Certificate (NTC)/national Business Certificate (NBC) Examinations are external examinations in Nigeria which provide standardised grading processes giving results which are expected to be comparable.

4.8.1.2 General Mental Ability (GMA)

The cognitive attributes of the participants were operationalised as GMA which was measured using an adaptation of the Wonderlic GMA test widely used in the USA (Wonderlic I, 2002). The Wonderlic GMA test measures verbal, numerical and spatial ability. Adaptation was with respect to terminology, currency and units of quantification to make the test appropriate for the Nigerian context. A sample of the GMA test used in carrying out this study is included in Questionnaire A (Annex 3.2) in the Appendix.

4.8.2 Emotional Attributes Measures

4.8.2.1 Motivation measure

Guay *et al.* (2003) define intrinsic motivation as doing something for its own sake because it is interesting and enjoyable while external motivation is doing something for instrumental reasons. On the motivation continuum, intrinsic motivation is at the high end and is driven by emotions that emerge while engaging in the activity. External regulation lies at the low end and refers to doing an activity in order to obtain rewards or to avoid punishment. The behaviour is so regulated that it is completely non-internalised. Next to this is introjected regulation which refers to the regulation of behaviour through self-worth contingencies such as ego and guilt. It involves partial internalisation which remains controlling, not volitional. Identified regulation refers to doing an activity because one identifies with its value or meaning to the extent that it becomes autonomously regulated. Integrated regulation refers to identifying with the value and meaning of the activity to the point where it becomes part of a person's habitual functioning and sense of self. Driven by values and goals it is still a level below intrinsic motivation and it is done for the instrumental value it represents.

The Global Motivation Scale (GMS-28) developed and validated by Guay *et al.* (2003) sub-divided the intrinsic motivation subscale into intrinsic motivation to know; intrinsic motivation toward accomplishment; and intrinsic motivation to experience stimulation. The instrument also includes a seventh subscale to measure amotivation (a state of lacking any motivation to engage in any activity) resulting in a 28-item scale, 4 items per subscale assessed on a 7-point scale.

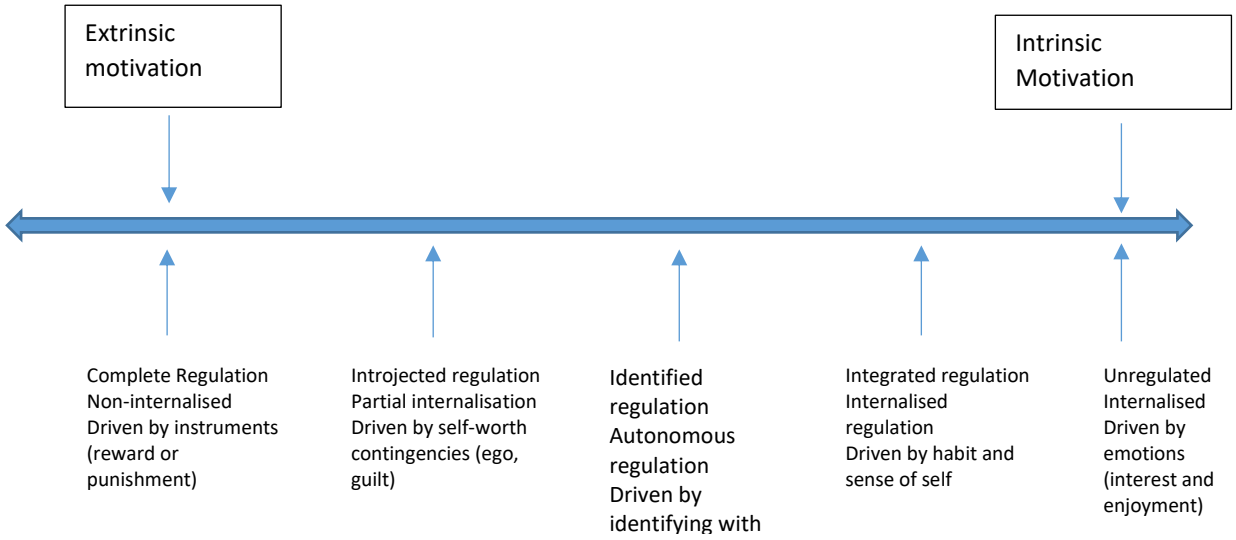

Figure 4.10 Continuum of motivation

This research sought to measure the motivation of construction workers towards learning as well as performance and the GMS-28 was considered appropriate because not only does it assess people's global motivation towards behaving in general in their life as a whole but it also specifically measures the intrinsic motivation towards knowledge, accomplishment and experience stimulation. The GMS-28 used to measure worker motivation in this research is included in Annex 3.2 in Appendix III.

4.8.2.2 Creativity measure

Creativity has been defined as the development of ideas and products, practices, services and procedures that are novel and potentially useful to organisations (Shalley *et al.*, 2004). This definition assumes that creative ideas may be generated by employees in any job and at any level of the organisation. A creative person is someone who regularly solves problems, fashions products, or defines new questions in a domain in a way that is initially novel, but ultimately becomes accepted in a cultural setting (Navaresse, 2014 citing Gardner, 1993). Similarly, a product or response is judged creative if it is novel, appropriate, useful or valuable in solving a problem that is heuristic rather than algorithmic (Amabile, 1996).

Shalley *et al.* (2004) argue that creativity is a function of employee personal characteristics, the characteristics of the context in which they work and also the interactions among these characteristics. The personal characteristics of interest here are personality and cognitive style dimensions. An individual with a creative personality is open to experience and is therefore expected to have broad interests, and to be curious, flexible, and untraditional. Open individuals are more flexible in absorbing information and in combining new and unrelated information. Creative individuals are capable of divergent thinking. Individuals with innovative cognitive styles are more willing to risk violating the norm in order to develop solutions to problems that are different from previous ones while individuals with adaptive cognitive styles operate within established paradigms and procedures without questioning their validity.

Creative behaviour has been measured using single supervisor ratings in field studies (Tierney *et al.*, 1999; Zhou and George, 2001). Shalley *et al.* (2009) and Long (2013) used

self-reported ratings in field studies of creativity arguing that it provided better anonymity of participants, that employees are best suited to self-report creativity as they are the ones who are aware of the subtle things they do in their jobs that make them creative, and that self-rating has been found to be highly correlated with the supervisor-rated creativity level (Janssen, 2000). Shalley *et al.* (2004), however, did suggest that future studies should include evaluations of each employee's creativity by multiple judges (co-workers, supervisors and self).

The creativity measure for this research measured the creative behaviour of construction workers using self-evaluations. The questions rated participants' creative abilities in the areas of: divergent thinking; lateral thinking; imagination; remote associations; and creative problem solving. A "What am I like" questionnaire was developed with five questions each covering the divergent thinking, lateral thinking, imagination and remote association subscales. A separate section with 10 open ended questions assessed creative problem solving. A sample of the questionnaire is included in the Appendix.

4.8.2.2.1 Divergent thinking

This involves thinking in an unusual and un-stereotyped way to generate several possible solutions to a problem. Divergent thinking embraces originality, curiosity, flexibility, and the confidence to push boundaries beyond accepted conventions. It also embraces the ability to eliminate the fear of what others think.

4.8.2.2.2 Lateral thinking (Thinking outside the box)

This involves thinking differently, unconventionally and from a new perspective. It employs the ability to use inspiration and imagination to solve problems by looking at them from unexpected perspectives. Lateral thinking involves discarding the obvious, leaving behind traditional modes of thought, and throwing away preconceptions.

4.8.2.2.3 Imagination

This involves the ability to form new images and sensations in the mind that are not perceived through senses such as sight, hearing, or other senses. Imagination helps make knowledge applicable in solving problems and is fundamental to integrating experience and the learning process.

4.8.2.2.4 Remote associations

This involves the ability to make connections between things that do not usually have an apparent connection; the ability to see things as wholes rather than as individual parts; or the ability to embrace a holistic perspective of things rather than an atomistic one.

4.8.2.2.5 Creative problem solving

This involves using the abilities described above to solve problems in a creative manner.

4.8.2.3 Craftsmanship Measure

Craftsmanship concerns the motivation to do work to a high quality and to produce high quality results. The craftsmanship attribute is different from being a tradesman. Beckham (2002) defines craftsmanship as “pride in work” but Sennet (2008), though

agreeing that craftsmanship can reward an individual with pride in work, argues that the rewards are not that simple. It is the desire to do a job well for its own sake and brings job satisfaction that has nothing to do with rewards. Sennet (2008) describes craftsmanship as the skill of making things well, a basic human impulse, the desire to do a job well for its own sake.

The questions in this measure seek to rate workers' craftsmanship in the following areas: motivation to do good work; pride in work and in the quality of work; desire to perform excellently; a willingness to strive towards excellence and philosophical understanding of craftsmanship. A "What am I like" questionnaire was developed with seven questions covering these behaviours and perceptions. A sample of the questionnaire is included in the Appendix

4.8.3 Social Attributes

4.8.3.1 Communication Skills Measure

Communication has been defined variously as any interaction that takes place between people (Donnelly and Neville, 2008), a systemic process in which individuals interact with and through symbols to create and interpret meaning (Wood, 2004), and the imparting or exchanging of information by speaking, writing, or using some other medium (Oxford Dictionaries, 2015). Emmitt and Gorse (2003) note that communication involves information gathered from verbal and non-verbal communication, body language, facial expression, touch, and olfactory information from our immediate environment.

The traditional communication model which is formally known as the Shannon and Weaver Transmission model draws on a mechanistic framework of communication which is linear and is considered inadequate in modelling the complexity of human interaction (Donnelly and Neville, 2008). Wood (2004) proposed a transactional model of communication which combines principles from the psychological, social constructionist and systemic frameworks of communication. Specifically, the transactional model recognises the use of multiple channels of communication during a single communication process. These communication channels include: facial expressions; body angle; posture; presentation; tone of voice; words; word images; and role portrayal. Donnelly and Neville (2008) note that in an average face-to-face communication, 55% of the content of communication is communicated by body language, 38% by voice tonality (non-verbal vocalisation) and 7% is communicated by words. Good communication would therefore require the ability not only to use the various channels of communication but also the ability to decode when other people use them. Good communication would also require the ability to use and understand various communication media.

Klakovich and Dela Cruz (2006) outline eight dimensions of interpersonal communication and they are: prescriptive communication (to offer advice and make suggestions); informative communication (to give information, instruct, impart knowledge); confronting communication (to challenge restrictive or compulsive behaviour); cathartic communication (to release emotion through tears or angry sounds); catalytic communication (to be reflective, to ask questions); supportive communication (to offer support, validation, confirmation); listening (to give attention to others, recalling and understanding their messages); and non-verbal communication

(using body language and understanding others' use of it). Shepherd *et al.* (2010) summarise eight core areas of competency essential for effective interpersonal interactions and they are: self-awareness; effective listening; questioning; oral communication; helping or facilitating; reflecting; assertiveness; and non-verbal communication. The questions included in the measure of communications skills therefore cover the following elements of effective communication:

1. Effective listening
2. Questioning
3. Empathy and respect
4. Verbal communication (prescriptive; informative; confronting; and supportive)
5. Reflecting
6. Assertiveness
7. Non-verbal communication (body language; facial expression; voice tonality; and other non-verbal vocalisations)
8. Use of work related communication media

4.8.3.2 Social Skills Measure

Schumaker and Hazel (1984) define a social skill as any cognitive function or overt behaviour in which an individual engages while interacting with another person or persons. Ferris *et al.* (2001) suggest that social skill reflects interpersonal perceptiveness and the capacity to adjust one's behaviour to different situational demands and to effectively influence and control the responses of others. Individuals high in social skills are able to interpret subtle social cues; to effectively use social perceptions to determine appropriate, timing, sequencing, context and content of an influencing attempt; to

improvise when a planned presentation strategy is unlikely to work; and know when to speak and when to keep silent (Schumaker, 1984; Ferris, 2001). Seal *et al.* (2015) include abilities such as consideration for others and connection to others while Sackett and Walmsley (2014) found that dependability, cooperation and integrity were rated as important personality attributes for performance in the construction workplace.

Schumaker and Hazel (1984) suggest a number of criteria for ideal measurement of social skill functioning. The device should measure a person's behaviours; the consequences of those behaviours; the quality of behavioural responses (sequencing, timing, contexts, content); whether or not the skills are present in the person's repertoire (revealing a skills deficit); whether the person is motivated to use the skills they possess (revealing a performance deficit); the person's physical appearance; and the use of skills in situations of interest (Gresham, 1981; Shumaker and Hazel, 1984).

The following seven categories of social functioning were included in the social skills measure for the study:

(1) Connection to other people - the ease and effort in developing rapport and closeness to other people
(2) Consideration for others - empathising with or understanding another person's feelings and thoughts, regard for the person and situation before thinking and acting
(3) Positive engagement with other people – concern for other people and a willingness to influence and affect other people's lives positively
(4) Discriminating and making inferences about social cues which involves the ability to interpret cues such as facial expressions; motor actions; and voice tone and

adjusting choose skills appropriate to the relationship with the listener and the circumstances surrounding the interaction

(5) Predicting and evaluating consequences of social behaviour which involve the ability to choose socially acceptable behaviour by identifying the optional behaviours in a given situation; identify the consequences of each option; and specify which option to take.

(6) Self-control required for abstaining from behavioural excesses and antisocial behaviour.

(7) Managing conflict situations such as disagreement; argument; persuasion; explaining a problem; giving criticism; accepting criticism; suggesting a compromise

Overt social behaviours which are the non-verbal and the verbal components of social behaviour were treated under the communication skills measure and were therefore not included in the social skills measure. A total of 30 questions were selected for inclusion in the social skills measure with four questions for each of the identified categories of social skill functioning and an additional question each for empathy and engagement with other people.

4.8.3.3 Business-like Attitude Measure

An individual worker requires a business objective or sense of purpose to perform optimally whether as a sole trader who is trying to make a living or as part of a multi-national (Lucas *et al.*, 2012). Having a business-like attitude is a positive force that promotes products and services that meet the clients' or an employer's needs (Krishnan and Kamalanabhan, 2013). In any business setting, whether for profit or not for profit,

the skilled worker needs to understand and to practice the 'basics' of running or being in an organisation providing services or products with budgets and customers that need to be satisfied. A business-like attitude would manifest in behaviours such as punctuality, orderliness, willingness to put in necessary time and effort, and displays of customer service that exceed expectation. Ultimately business sense would include thinking and acting like an owner of the business, involving exhibiting behaviours such as customer focus; persistence in pushing ideas through to successful implementation; taking the long view required when building something great; taking responsibility for results; and sharing in the vision of the business (Alexander West, 2013).

The questions in this measure sought to rate workers' business-like attitudes in the following areas:

(i) Business objective or purpose: Understanding the organisation's business objective and purpose.

(ii) Shared vision: Sharing in the vision of an organisation or a project motivates an individual to help in making the vision a reality

(iii) People orientation and customer focus: Ability to create relationships with contacts, peers, supervisors, managers. Developing a viewpoint that puts the organisation's customers first

(iv) Persistence: A strong commitment even in the face of inevitable difficulties

(v) Long view and improvement orientation: The recognition that investment in activities pay off over time. Seeing the *status quo* as temporary and therefore opportunities for continuous improvement exist

(vi) Responsibility for results: A sense of responsibility towards producing excellent results, the ability to hold oneself accountable for the success of the business

(vii) Conscientiousness: Ability to be organised, balancing multiple tasks, keeping track of appointments and diligence

A total of 23 items were developed for this measure, three items each for business objective, shared vision, people orientation customer focus, persistence and long view and improvement orientation while four items each were developed for responsibility for results and conscientiousness

4.8.4 Performance

Cheng *et al.* (2007) note that employee performance may be defined as the achieved work outcomes for each job function during a specified period of time and that performance evaluation or appraisal is a system of measuring and evaluating an employee's job related attributes, behaviours, and outcomes to assess an employee's productivity and judge whether he or she will perform as well or more effectively in the future, so that the employee, the organization, and society can benefit. The most prevalent method of evaluation uses performance ratings which are subjective evaluations obtained from supervisors, peers, subordinates, self, and/or customers.

Ng and Feldman (2009) broadly categorise performance into three domains: core task behaviours, citizenship behaviours and counter-productive behaviours. Core task performance refers to the basic required duties of a job; citizenship performance refers to those extra behaviours over and above the core tasks which promote and strengthen

the organisations effectiveness e.g. helping co-workers, teamwork, etc.; and counter-productive performance are the voluntary behaviours that harm the well-being of the organisation e.g. theft, substance abuse, absenteeism, workplace aggression, etc.

Manoharan *et al.* (2011) outline three measures of performance namely, assessing results (what people achieve), assessing behaviours (what people do) and assessing personal characteristics (what people are). Borman and Motowidlo (1997) distinguish between the task performance and contextual elements of job performance, task performance representing the activities that contribute to the organisations technical core and contextual activities that contribute to organisational effectiveness in ways that shape the organisational, social and psychological context that serve as catalyst for task activities. Viswesvaran *et al.* (1996) define ten dimensions of job performance namely, overall job performance; productivity; quality; leadership, communication competence; administrative competence; effort; interpersonal competence; job knowledge; and compliance with or acceptance of authority.

Dainty *et al.* (2003) introduce a nine-factor model of job performance for project managers made up of team building, leadership, decision making, trust, honesty and integrity, communication, understanding and applications, self-motivation, and external relations. Cheng *et al*. (2007) propose four factor labels for job performance namely, task which contains nine items (job knowledge, quality of work, ability, judgment, experience, accuracy, responsibility, efficiency, and initiative) behaviour which contains six items (honesty, personal care, punctuality; cooperation, attitude, and equity); management with five items (guest relations, leadership, communication skills,

interpersonal relations, and planning); and "self" with five items (gender, age, interest, creativity, and dependability).

This research was concerned with assessing the results dimension of performance (what the construction intermediate skilled worker has achieved) and also with assessing the behaviour dimension of performance (what the construction intermediate skilled worker does) that directly contributes to organisational effectiveness and indirectly contributes to results. The assessments of personal attributes that effect performance were carried out using separate measures. The criteria for performance measurement in this research are derived from literature in combination with the perceptions of domain experts on the appropriate criteria for evaluating performance of construction skills obtained during the pilot study. Table 4.7 lists the performance assessment criteria.

Table 4.7 Performance assessment criteria

Achievement Assessment Criteria	**Contributory Behaviour Assessment Criteria**
Quantity of work completed (Productivity)	Attitude
Technical skill	Teamwork
Quality of output	Cooperation
Efficient use of materials	Interpersonal relations
Efficient use of tools and equipment	Ability to work under pressure
Efficient use of time	Punctuality
Judgement	Additional responsibilities (supervision, mentoring, coaching)

The performance measure based on these is made up of 14 items and for each case four assessments were carried out comprising: a self-assessment, two peer assessments and one supervisor assessment. The purpose was to get a 360-degree assessment of each participants' performance to eliminate bias. The participants were scored on a scale of 0 to 7 ranging from 'no performance' to 'excellent performance'. A sample of the performance measure developed and used for the study is included in Social, Emotional and Cognitive Attributes questionnaire (Annex 3.2) in the Appendix III of this thesis.

4.8.5 Data Analysis

Means and standard deviation described the data collected and correlations studies, were used to explain the relationships and dependencies between the variables under study. Reliability estimates and t-tests provided the measures of significance and confidence in the results achieved.

4.9 The Construction Firm Learning Environment Studies (Phase 4)

This aspect of the research covers in part research objective number 5 which is to develop a conceptual skills learning model that optimises worker performance in line with the strategic goals of construction firms. Case studies within the three construction firms were conducted to complete objective. For each case study firm, thorough systems analyses were carried out to: analyse processes, procedures and resources for planning and implementation of learning and development programmes; and assess learning system fit with firm's business strategy.

4.9.1 Analyses of Processes, Procedures and Resources for Learning

Face to face interviews were the primary method of data collection. Participants included management, HR department staff, supervisors and workers. Interviews were semi-structured guided by questions based on the results of the preliminary exploratory study. The organisation's archival documents such as vision, mission statement, organogram, annual training plans, training resources such as safety manuals, and performance evaluation forms formed the secondary data. The multiple sources of evidence were expected to provide validity through data triangulation (Yin, 2014).

4.9.1.1 Case Study 1 (CS1)

Interviews were conducted with a total of 42 persons within the firm and this number was considered adequate because data saturation had been achieved. Saturation was reached when no new data was being added by additional interviews (Bowen, 2008; Cresswell, 2013; Glasser and Strauss, 2009; Saunders *et al*., 2016). Table 4.8 shows the distribution of interviewees for CS1.

Table 4.8 CS1 Interviews distribution

Staff category	**Number of interviews**
Management	7
HR Division	7
Supervisors	7
Professional staff	7
Technical staff	14
Total	**42**

Documents collected include: organisational charts; advertisement for construction artisans/tradesmen (indicating minimum job requirements); learning evaluation forms; performance evaluation templates; health and safety policy guidelines; and samples of standard operating procedures were collected from the administrative department, the training department and from the workshops.

4.9.1.2 Case Study 2 (CS2)

A total of 27 persons within the firm were interviewed and this number was considered adequate because saturation was achieved (Bowen, 2008; Cresswell, 2013; Glasser and Strauss, 2009; Saunders *et al*., 2016). Table 4.9 shows the distribution of interviewees for CS2.

Documents collected include policy documents on training, organisational structure charts and recruitment advertisements showing minimum job qualifications for intermediate skills.

Table 4.9 CS2 Interviews distribution

Staff category	**Number of interviews**
Management	3
Administrative department	3
Supervisors	4
Professional staff	10
Technical staff	7
Total	**27**

4.9.1.3 Case Study 3 (CS3)

A total of 8 persons within the firm and this number was considered adequate because saturation was achieved (Bowen, 2008; Cresswell, 2013; Glasser and Strauss, 2009; Saunders *et al*., 2016). Table 4.10 shows the distribution of interviewees for CS3.

Table 4.10 CS3 Interviews distribution

Staff category	**Number of interviews**
Management	2
HR Division	N/A
Supervisors	2
Professional staff	1
Technical staff	3
Total	**8**

Documents collected included in-house training manuals from one of the construction site offices visited.

4.9.2 Learning System Fit with Business Strategy

This aspect of the study was conducted with management staff from each of the case study firms to gain consensus on the appropriate modelling tool for the model. Table 4.11 shows the distribution of participants across case study firms

4.9.3 Cross-Case Synthesis

Case study reports were produced for each of the case studies and cross-case synthesis were carried out to match patterns, to build explanations, to consider rival explanations

and to model processes. A tentative model for skills learning within the construction firms was proposed at the end of this process. This tentative model was then further refined within the construction firm using focus groups.

Table 4.11 Distribution of participants for learning system fit with firm's business strategy

Case study firms	Participants
CS1	2
CS2	2
CS3	2

4.10 Model Development

de Bruin, *et al.* (2005) note that maturity models have been used as evaluative and comparative basis for improvement, and have also been used to derive an informed approach for improving capability in a specific area of the organisation. The maturity model concept, popularised by the Carnegie Mellon Software Engineering Institute (SEI), has generated numerous maturity models across many domains. It was designed to assess the competency, capability and level of sophistication in a domain based on a set of criteria and to indicate an approach to maturity improvement (Curtis *et al.*, 2009; de Bruin *et al.*, 2005; Fraser *et al.*, 2002). Some examples of existing models in the construction industry are detailed in Table 4.12

Table 4.12 Examples of maturity models in construction

Model	Domain	Key Reference
Fuzzy industry maturity grid (FIMG)	Construction industry at national-industry level	Tay and Low (1994)
Standardised process improvement for construction enterprise (SPICE)	Design, construction and maintenance processes	Sarshar *et al.* (1998)
SPICE FM	Facilities management	Amaratunga *et al.* (2002)
GAPP-IT	IT training impact on business strategy in construction firms	Goulding and Alshawi (2002)
Construction supply chain maturity model (CSCMM)	Supply chain management in construction organisations	Vaidyanathan and Howell (2007)
Organisational project maturity model (OPMG3)	Project management	Project Management Institute (PMI) (2005)
Construction industry macro maturity model (CIM3)	Construction industry project performance	Willis and Rankin (2012)

4.10.1 Beyond SEI's People Capability Maturity Model (P-CMM)

The SEI's P-CMM which is a derivative of SEI's Capability Maturity Model (CMM) was developed specifically to guide organisations to improve their processes for managing and developing their workforce (Curtis, *et al*., 2009). Although a number of business process maturity models address HRD issues, Josko and Cortes (2004) report that none of the models studied showed the cover of P-CMM with regard to people. The report specifically concludes that the P-CMM people management practices strengthen a more symbiotic relationship between people and organisations and is therefore appropriate for organisations that are intensively dependent on human knowledge as a factor of production (Josko and Cortes, 2005, Curtis *et al.*, 2009).

This research was influenced by the P-CMM in the development of a maturity model for construction firms in Nigeria because of its specificity to people management and development processes and its generic use across a wide range of domains. Curtis *et al.*

(2009) suggest that the P-CMM has been used successfully in construction organisations; however, documentation of its applicability to construction is not evident. The unique nature of construction suggests that generic models that work in other domains need to be adapted to the project-based, capital and labour intensive nature of construction for applicability. Furthermore, Roglinger *et al.* (2012) recommend future research in the area of "situational maturity models" in order to make maturity models capable of better fit to organisation-specific needs. Sashar, *et al*., (2000) note that tailoring the CMM to construction is not a linear mapping exercise but that the core ideas must be abstracted and then recreated in a form which fits the construction context.

4.10.2 Classification of Maturity Models by Purpose of Use

A maturity model serves a descriptive purpose when applied to as-is assessments. A prescriptive model provides emphasis on the domain relationships to business performance and indicates an approach to maturity improvement while a comparative model allows for internal and external benchmarking (de, Bruin *et al.*, 2005; Roglinger, *et al.*, 2012). These model types are not distinctive but represent evolutionary phases of a model's life cycle starting with a descriptive purpose, evolving into a prescriptive and finally into a comparative model (de Bruin *et al.*, 2005). Various approaches have been used in developing maturity models. de Bruin *et al.* (2005) present a framework for maturity model development applicable across a range of domains. The de Bruin *et al.* (2005) six-phase framework was designed to provide a sound basis to guide the development of a descriptive maturity model and its progression into prescriptive and comparative purposes within the given domain.

4.10.3 Criticisms of Maturity Models

Roglinger *et al*. (2012), based on a comprehensive critical review of literature outline the following criticisms of maturity models:

- Maturity models are step-by-step recipes that oversimplify reality and lack empirical foundation
- Maturity models neglect the existence of multiple and possible equifinal maturation paths
- Maturity models should be configurable since internal and external characteristics may limit the applicability of the standard version
- Models focus on a sequence of levels towards a predefined 'end state' instead of factors that actually influence evolution and change
- There exist multiples of similar maturity models
- Dissatisfactory documentation
- Non-reflexive adoption of CMM
- Missing economic foundation to maturity models

4.10.4 Design Principles to Mitigate Criticisms

In order to mitigate the criticisms, maturity models are evaluated from design process and design product perspectives (Roglinger *et al.*, 2012). From a process perspective, de Bruin *et al.* (2005) present a six-phase design process: scope; design; populate; test; deploy; and maintain. From a design products perspective, quality (desirable properties), components and design principles define maturity models. Desirable properties may include a valid, reliable and cost-effective capability assessment method, an empirical foundation to model development, software tool support, standardisation, flexibility or adaptability, certification, disclosure of potential for improvement, and

evidence of correlation between model adoption and performance improvement (Roglinger *et al.,* 2012).

De Bruin *et al.* (2005) suggested a hierarchical multiple layer structure of components, while Fraser *et al.* (2002) prescribed components comprising levels, descriptors, description for each level, capability areas (dimensions), activities for each capability area, and a description of each activity as performed at a certain maturity level. Roglinger *et al.* (2012) propose a framework of general design principles for maturity models comprising three nested groups: basic design principles; design principles for descriptive purpose use; and design principles for prescriptive purpose use.

4.10.5 Workforce Maturity Model Development Process

4.10.5.1 Outline process

The purpose of the proposed model is to provide a structured approach to the continuous improvement of capability in the learning, development and as a consequence, the performance of an organisation's workforce. The development process commenced with an integration of concepts derived from:

1. Literature reviews covering:
    - Contemporary, holistic and integrated learning theories
    - WfD best practice
    - Construction project management
    - Business strategy

2. Analysis of research results from:

- Surveys of construction expert opinions of significant personal attributes for individual performance
- Survey of construction managers' perceptions of construction workplace learning priorities
- Correlational studies between personal attributes and individual performance
- Interviews of personnel at all levels in three case study construction firms

4.10.6 Theoretical underpinnings

The underlying principle in developing the learning model was that it is the responsibility of the organisation to provide an environment with workforce improvement opportunities while the individual worker is responsible for taking advantage of those opportunities. Continuously improving the capabilities of these two parties (the units of analysis) to do these within the ambit of achieving organisational goals is the main objective of the proposed model.

The theoretical underpinning for the conceptual model therefore comprise:

- Holistic and integrated learning theories allowing for psychological and social perspectives pertinent in workplace learning (Billet, 1992; Eraut, 2004; Kolb, 1984; Illeris, 2003; Lave and Wenger, 1991; Wenger, 2009)
- Organisational learning, learning organisation and continuous improvement theories (Argyris, 1997; Nonaka and Takeuchi, 1991; Senge, 1990)
- Performance at work (Borman and Motowidlo, 1997; Cheng, *et al.*, 2007; Dainty *et al.,* 2003; Eraut and Hirsh, 2007; Manoharan *et al.,* 2011; Visveravan, 1996)

- Construction business development and strategy (Holbeche, 2009; Langford and Male, 2001; Junnonen, 1998; Osabutey *et al.*, 2012)
- Capability maturity modelling technique (Curtis *et al.*, 2009; Paulk *et al.*, 1993)

4.10.7 Model Design Process and Product

4.10.7.1 Design process

This research relied on the framework developed in de Bruin *et al.* (2005) because it was supported by consolidated methodological approaches. The framework was tested by two universities (Arizona State University and Queensland University of Technology) while independently developing maturity models in Business Process Management and Knowledge Management respectively. This is important because support for the framework was provided through the consolidated methodological approaches including testing employed during model development within these universities. Business process management and knowledge management have significant overlap with WfD and the resulting framework was therefore considered suitable for application to this aspect of the research. From a design process perspective, the methodological approach of de Bruin *et al.* (2005) has been validated by its use in various related studies. However, development of the model in this research goes through only the first four phases of development prescribed in the de Bruin *et al.* (2005) framework, namely: scoping; designing; populating and testing of the model. The deploying and maintaining phases are considered beyond the scope of the research. Figure 4.11 outlines the entire process followed in developing the conceptual construction workforce learning and development model.

4.10.7.2 Design Product

From a design product perspective, the following design principles were explicated in line with Roglinger *et al.* (2012):

- Basic information about the application domain: purpose of use; target audience; comparison with other maturity models; documentation of design process; limitation of application
- Definition of central constructs related to maturity and maturation: underlying notion of maturity; capability areas and maturity levels descriptors, maturation paths, level of granularity on which maturity can be observed, and explication of theoretical foundations concerning original capability and change.
- Definition of central constructs of the application domain
- Intersubjective verifiable assessment criteria for each step and level of granularity. A high level of granularity for the complex construction domain comprising: four domain dimensions each made up of five components and 25 sub-components; and 200 detailed assessment questions.
- Improvement measures in the sense of good or best practices for each stage and level of granularity.

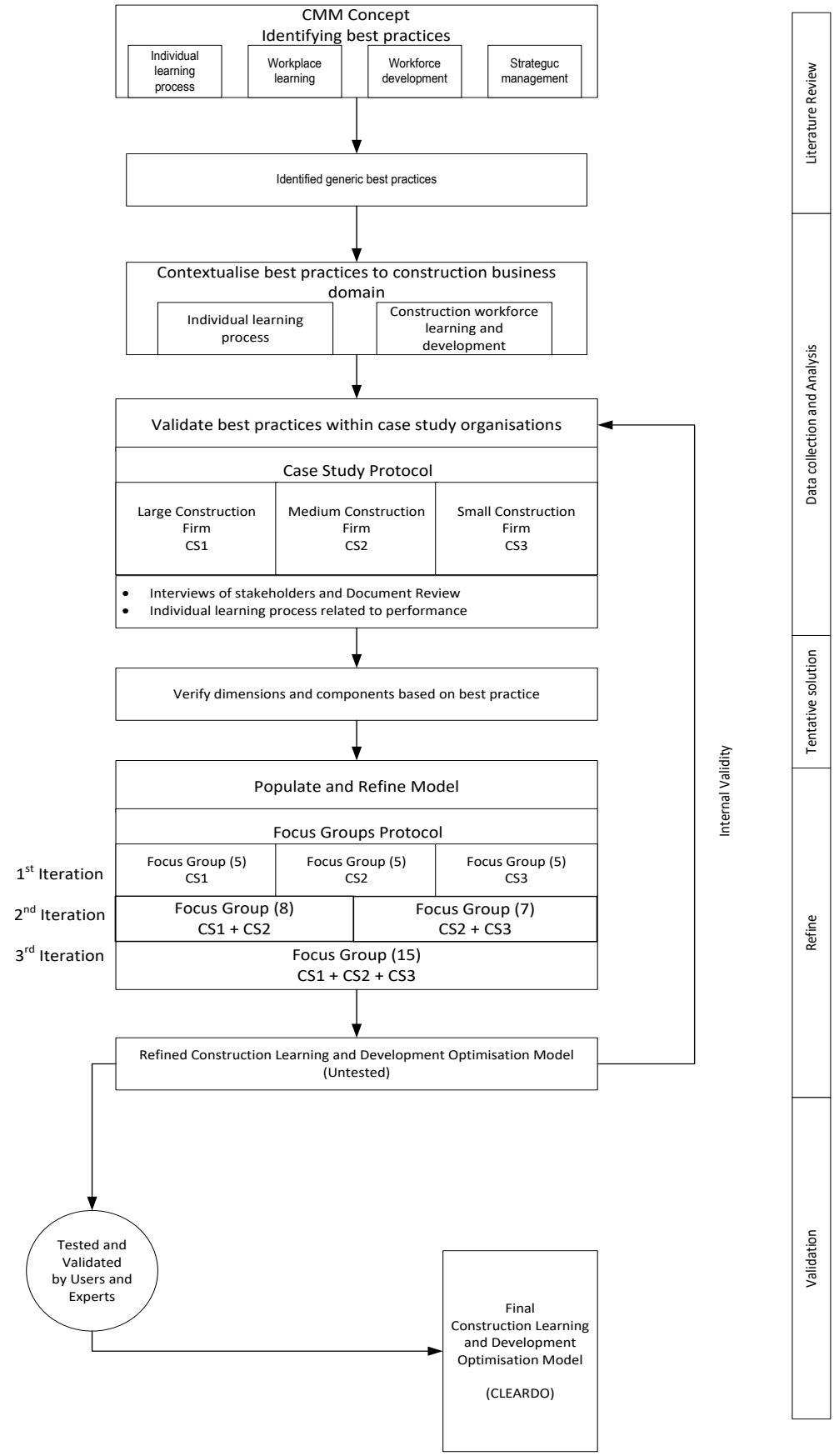

Figure 4.11 Model development process

4.11 Chapter Summary

Chapter 4 detailed the methodology for the research commencing with discussion of methodological concepts, philosophies, paradigms, approaches and methods of data collection and analysis. A pragmatic lens was adopted for the research and this allowed for a mixed method approach for the research. Ontologically the research embraced social constructionism while epistemologically an interpretivist stance was adopted. However, both qualitative and quantitative approaches were adopted for the research methods employed for data collection and analysis as appropriate for each of the tasks outlined for achieving the research objectives. Table 4.13 summarises the methods used for this research.

Table 4.13 Summary of methods used for this research

Research Aim: To develop a dynamic, conceptual, skills learning model that enables construction firms to optimise individual worker performance by integrating effective and efficient learning approaches into the firms existing business models.						
Research Objectives	**Tasks**	**Literature review**	**Questionnaire survey**	**Psychometric tests**	**Interviews**	**Focus group discussions**
To critically analyse and evaluate the determinants of effective learning of construction skills with specific respect to: the knowledge requirements of the construction industry; the existing education and training frameworks; the core issues of learning; learning techniques and the application of learning towards achieving optimal individual performance.	(1) Review of classical and contemporary theories of learning	P				
	(2) Review of knowledge and intelligences and the development of competence and expertise	P				
	(3) Review of the knowledge age and requirements for life-long learning, adult learning and workplace learning	P				
	(4) Identify key learning and performance attributes	P				
To critically analyse and evaluate the core business challenges facing firms in the construction sector with specific emphasis on: the appropriate learning within the workplace for achieving organisational goals; determining workplace learning best practice; and the frameworks for modelling learning processes and procedures to align with organisational business strategy.	(5) Review human capital theory, the link between learning and performance	P				
	(6) Review construction business strategy and the place of HRM and HRD	P				
	(7) Review learning and development in construction business	P				
	(8) Identify key WLD practices	P				

KEY: P Primary method S Secondary method

Table 4.13: Summary of methods used in this research (cont'd)

Research Objectives	Tasks	Literature review	Questionnaire survey	Psychometric tests	Interviews	Focus group discussions
To critically evaluate the Nigerian construction industry in respect of the precise knowledge requirements and personal attributes needed for learning effectiveness and optimal performance of intermediate skilled workers on construction sites; the appropriate pedagogical approaches needed for delivering these attributes; the evaluation of available skills learning and development frameworks; and evaluating the effectiveness of workplace learning best practice to align with organisational business strategy.	(9) Conduct an exploratory questionnaire survey to obtain the perceptions of domain experts on the Nigerian construction industry requirements for knowledge and their evaluation of skill supply from various providers.	S	P			
	(10) Conduct an exploratory questionnaire survey to distil construction domain experts' perceptions of the significant individual attributes evident in optimal performance of construction skills, the learning methods and approaches effective for learning on construction sites.	S	P			
	(11) Conduct an exploratory questionnaire survey to elicit construction managers' perceptions of the significant workforce practices critical for learning and development in the construction workplace	S	P			
To critically examine the relationship between construction intermediate skilled worker attributes, individual performance, pedagogy, organisational goals and the push-pull forces that deliver or impede success.	(12) Conduct psychometric tests to further deepen understanding of the relationship between individual attributes and performance	S		P		

KEY: P Primary method S Secondary method

Table 4.13: Summary of methods used in this research (cont'd)

Research Objectives	Tasks	Literature review	Questionnaire survey	Psychometric tests	Interviews	Focus group discussions
To develop a conceptual learning and development model that purposefully optimises construction worker performance to the strategic goals of construction firms	(13) Conduct interviews within case study organisations to contextualise WLD practice	S			P	
	(14) Synthesise findings from literature, from exploratory questionnaire surveys, from psychometric tests, and from case study interviews the key components of a WLD solution for construction firms	S				
	(15) Facilitate focus group discussions to validate the component structure of the model, to populate and to refine the model.	S				P
To test and validate the conceptual learning and development model to confirm construct validity, homogeneity, functionality and replicability.	(16) Present the model to management of the three case study firms that participated in model development for validation	S			P	
	(17) Distribute the refined model to focus group, members with a validation questionnaire attached, for participant validation	S	P			
	(18) Distribute the refined model to management and staff of three equivalent construction firms other that the participating firms and to members of the academia with validation questionnaire attached for external validation	S	P			

KEY: P Primary method S Secondary method

CHAPTER 5 PRELIMINARY EXPLORATORY STUDY

5.1 Introduction

This chapter presents the results of the preliminary exploratory studies. These studies were designed to achieve Objective 3 of the research which is:

> *"To assess the Nigerian construction industry for intermediate skills knowledge requirements and learning provision; and for workforce learning and development practice."*

To achieve this objective, the research focused on two main areas: individual learning and performance; and the construction business where learning is expected to take place. For individual learning and performance, the research explored the human learning process and links to performance, the knowledge requirements and appropriate learning approaches for the construction environment. However, these three elements are basic to designing optimal pedagogy as elicited from literature and outlined in section 2.1. For the construction business learning environment, the research explored the applicability of the WLD best practice (Annex 1.2) distilled from extant literature to construction firms in Nigeria. Two questionnaire surveys were therefore carried out to capture and synthesise the perceptions of domain experts on each of the two units of analysis for the research: the individual worker (learner); and the construction business (learning environment).

5.2 Individual Worker Learner Studies

The domain experts for this aspect of the study included licenced architects, builders, civil engineers, quantity surveyors, construction managers, site supervisors and educators and trainers in construction skills. Specifically, the study was designed to

describe the Nigerian construction environment with respect to: knowledge requirements; the supply systems for construction skills learning; the individual attributes required for effective learning and performance of intermediate construction skills; the effectiveness of various learning approaches when applied to construction intermediate skilled workers; and the appropriate criteria for measuring the performance of construction intermediate skilled workers. The questionnaire (A) for the survey was developed based on the findings from the literature review (see Chapter 2). Details of the questionnaire development methodology are given in section 4.6.1.1, while the population, sampling method, sample size and distribution are given in sections 4.6.1.2, 4.6.1.3 and 4.6.1.4 respectively.

5.2.1 Sample Distribution and Response Rate

A proportionate stratified random sampling method was used to select participants for the survey in this aspect of the research and the purpose was to obtain a sample more representative of the population from which it was drawn than a simple random sample (Bryman, 2016; De Vaus, 2014; Leedy and Ormrod, 2010). Table 5.1 presents the proportionate sample distribution and associated response rates. Although response rates for some strata were lower than expected, overall representation was considered satisfactory. Overall response rate was 27.9% and this compares favourably with similar surveys. For example, Destimas *et al.* (2016) achieved a response rate of 28%, Wong *et al.* (2009) obtained a 27.7% response rate, and Soetanto and Proverbs (2004) a response rate of 14.1%.

Table 5.1 Sample size, strata and response rate

	Population	Sample Size	Percentage of Strata Size to Population	Valid Response	Percentage of Strata Responses to Total Responses
Construction Manager	214	14	1.4	14	5.1
Architect	2515	168	17.0	49	17.8
Builder	1708	114	11.5	61	22.1
Civil Engineer	6504	434	43.9	32	11.6
Quantity Surveyor	1583	106	10.7	55	19.9
Site Supervisor	321	21	2.2	23	8.3
Educator/Trainer	680	45	4.6	33	12.0
Electrical Engineer	640	43	4.3	6	2.2
Mechanical Engineer	640	43	4.3	2	.7
Procurement Manager			0.0	1	.4
Total	14,805	988	100.0%	276	100%

Response Rate: 276/988 X 100% = 27.9%

5.2.2 Area of Coverage

The survey area covered one central location in each of the six geopolitical areas in Nigeria, specifically, South-West (Lagos); South-East (Enugu); South-South (Port Harcourt), North-Central (Abuja); North West (Kaduna); North-East (Bauchi). Figure 4.6 is a map of Nigeria showing the six geopolitical zones. Furthermore, Table 5.2 shows the geographical areas of Nigeria in which participants were involved in construction activity showing adequate coverage of the whole country in the survey. The sampling strategy therefore yielded results that were considered representative of construction domain expert opinion from every part of Nigeria.

Table 5.2 Construction activity of participants by geographical area

Geographical Area	South West	South East	South South	North West	North Central	North East
Participants (% Normalised)*	27.4	17.0	15.5	9.7	23.5	6.9

*Participants' construction activity may span more than one geographical area

5.2.3 Construction Environment in Nigeria

5.2.3.1 Knowledge requirements

Table 5.3 presents the mean, median, mode and inter-quartile ranges (IRK) for the eight items that characterise the Nigerian construction industry for knowledge requirements. The mean, median and the mode broadly coincide and support the notion of a normal distribution. IQR of 1 for all eight items suggests consensus among participants. The domain experts generally agreed that construction workers are multiskilled, are capable of multi-tasking on the construction sites, and exercise authority in making decisions about their work. Participants also agree that there is strict division of labour on construction sites (Median 3.23; IQR = 1).

There also appears to be consensus among the domain experts that construction firms do not employ greater use of technology relative to other sectors of the economy such as manufacturing or oil and gas. Participants agree that construction site workers do not work effectively with little supervision and do not take responsibility for the quality of their work on site. There is consensus also that mid level management is required on constriction sites.

Table 5.3 Mean, Median, Mode and IQR for knowledge characteristics of the Nigerian construction industry

Characteristic	Mean	Median	Mode	IQR
Construction firms in Nigeria employ greater use of technology in carrying out construction activity relative to other sectors of the economy (manufacturing, oil and gas)	2.37	2.00	2	1
Construction workers possess more than one construction skill	2.65	3.00	3	1
Construction workers are involved in a wide variety of activities on site involving more than one skill	2.65	3.00	3	1
Construction site workers work with little supervision	2.46	2.00	2	1
Construction workers exercise authority in making decisions within their specific area of activity on project sites	2.58	3.00	3	1
Construction workers exhibit great responsibility for the quality of their work on project sites	2.47	2.00	2	1
There is no requirement for middle level management in construction sites	2.14	2.00	2	1
There is strict division of labour on construction sites	3.23	3.00	3	1

These results suggest that construction organisations in Nigeria exhibit mainly the characteristics of Taylor-Fordist systems identified from literature such as strict division of labour; workers not taking responsibility for the quality of their work; low use of technology; high levels of supervision; and also the need for middle level management on construction sites (Washington, 1998; Ardichvill, 2003; Brockmann, Clarke and Winch, 2008). Conversely, construction organisations also show some tendencies towards knowledge based systems to the extent that construction workers are multi-

skilled; they carry out a variety of tasks on construction sites; and are allowed authority to make decisions concerning their specific area of activity on construction sites (Washington, 1998; Ardichvill, 2003; Brockmann, Clarke and Winch, 2008). Table 5.4 presents the survey results that characterise the Nigerian construction sector for knowledge requirements.

Table 5.4 Characterisation of Nigerian construction industry for knowledge requirements

Descriptor	Characteristic	Mean Score	Experts' Stance
Construction firms in Nigeria employ greater use of technology in carrying out construction activity relative to other sectors of the economy (manufacturing, oil and gas)	Knowledge Age	2.37	Disagree
Construction workers possess more than one construction skill	Knowledge Age	2.65	Agree
Construction workers are involved in a wide variety of activities on site involving more than one skill	Knowledge Age	2.65	Agree
Construction site workers work with little supervision	Knowledge Age	2.46	Disagree
Construction workers exercise authority in making decisions within their specific area of activity on project sites	Knowledge Age	2.58	Agree
Construction workers exhibit great responsibility for the quality of their work on project sites	Knowledge Age	2.47	Disagree
There is no requirement for middle level management in construction sites	Knowledge Age	2.14	Disagree
There is strict division of labour on construction sites	Taylor-Fordist	3.23	Agree

The results also suggest that the knowledge requirements and consequently the appropriate learning approaches are not clear cut for the Nigerian construction industry.

The current requirements for knowledge may appear Taylor-Fordist. However, the tendencies towards knowledge age systems may be significant for the future. Moving forward, this research therefore assumed that construction firms in Nigeria are tending towards knowledge age systems and are therefore positioned for the continuous improvement and/or transformation required.

5.2.3.2 Skills provision systems in Nigeria

Table 5.5 presents the perception of domain experts on the quantity and quality of skills supplied to construction sites by each of the main education and training systems in the Nigerian construction industry. The results suggest that the informal apprenticeship system provides the most skills in terms of numbers to construction sites but is ranked ninth in quality. This is consistent with the findings from other studies (Awe *et al.,* 2009; Medugu *et al.*, 2011). Foreign-based education and training systems provided the highest quality of skills but rank eighth in terms of numbers provided. Construction firms are perceived to provide the best training of construction skills within Nigeria. This is also consistent with studies in other countries which found that the construction sites of construction firms are perceived to provide the best location for construction skills training. (Mulcahy, 2000; Harris, *et al.,* 2001; Wang *et al.,* 2010; and Abdel-Wahab, 2012).

This research therefore took the view that a structured approach within construction organisations towards the learning and development of construction workers that includes intermediate skills levels has the potential for improving the quality and quantity of intermediate skills supplied to the organisation's and ultimately the industry

workforce. The proposed conceptual model was designed to provide a structured approach to construction WLD.

Table 5.5 Education and training provision quantity and quality

Training System	Mean Quantity Rating	Rank (Quantity)	Mean Quality Score	Rank (Quality)
Informal Apprenticeship	Usually	1	4.96	9
Polytechnic at ND level	Sometimes	2	6.15	5
Construction firm on-the-job	Sometimes	3	7.04	2
Tertiary institutions at HND/BSc level	Sometimes	4	6.54	3
Formal apprenticeship	Sometimes	5	6.49	4
Trade School	Sometimes	6	5.16	7
Technical College	Sometimes	7	5.04	8
Foreign-based	Sometimes	8	7.17	1
National Apprenticeship Scheme	Rarely	9	4.65	10
NBTE Enterprise Institutions	Rarely	10	5.53	6

5.2.4 Individual Attributes for Effective Learning and Optimal Performance

The goal of every education and training system is to develop in each trainee the knowledge and attributes necessary for performance of specified skills in the workplace. Table 5.6 shows the individual attributes for effective learning identified from literature that also have the potential of effecting individual performance. These attributes are broadly classified into cognitive, emotional and social attributes. The objective of this task in the research process was to select from the generic list of effective learning attributes, those that are also significant in for optimal performance of intermediate

construction skills. Participants were expected to deconstruct the performance of high and low performers of construction skills to determine which of these attributes were significantly evident or lacking in the in the workers, respectively. To achieve this, a randomised generic list of these attributes was presented to a proportionate stratified random sample of construction domain experts who were asked to identify, rank and rate (using a 4-point rating scale) the ten most significant attributes of: a prime example of an intermediate skilled worker they have known; a low performing example of an intermediate skilled worker they have known; and their concept of an ideal intermediate construction skilled worker of the future.

Table 5.6 List of attributes required for optimal performance

Cognitive	**Emotional**	**Social**
Technical skill	Motivation	Openness
Underpinning knowledge	Intellect	Social skills
Numeracy skills	Self-control	Communication
Literacy skills	Responsibility	Business-like
Ability to use a range of tools and equipment	Reliability	Service orientation
ICT skills	Creativity	
Knowledge of materials	Craftsmanship (pride in	
Multi skills	Individuality	
Meta skills (ability to learn, reflect)	Perception	
	Resourcefulness	
	Integrity	
	Innovative	

5.2.4.1 Analysis and Results

Data collected was analysed using descriptive statistics. Mean scores were calculated for each of the ten selected attributes in each of the categories. Three lists of the ten most frequently identified attributes; the ten most highly ranked attributes and the ten most highly rated attributes were extracted for each of the categories of intermediate skilled worker (prime, least performing and ideal). To obtain consensus of opinion, an attribute had to appear in at least two of the lists to be selected as a most significant attribute. Table 5.7 shows the lists of attributes selected consistently as most significant for each, the ideal and prime intermediate skilled worker and the attributes lacking in the least performing intermediate skilled worker.

Table 5.7 Significant attributes for learning and performance in order of preferences (for ideal worker, high performer and low performer)

S/No	Ideal Worker	Prime Worker	Least Performing Worker (Lacking attributes)
1	Technical skill	Technical skill	Technical skills
2	Creativity	Underpinning knowledge	Underpinning knowledge
3	Underpinning knowledge	Creativity	Integrity
4	Social skills	Motivation	Ability to use of appropriate tools and equipment
5	Motivation	Craftsmanship	Communication
6	Craftsmanship	Communication	Craftsmanship
7	Communication	Numeracy skills	Social skills
8	Numeracy	Business-like attitude	Intellect
9	Business-like attitude	Ability to use of appropriate tools and equipment	Reliability
10	-	Social skills	

Table 5.8 Significant attributes for learning and performance selected for further investigation

S/No	Final Selection
1	Technical skill
2	Underpinning knowledge
3	Creativity
4	Numeracy skills
5	Motivation
6	Craftsmanship
7	Communication
8	Social skills
9	Business-like attitude

The relative importance of each of the individual attributes for learning and performance of the ideal construction worker was determined using a well-developed relative importance technique (Okoroh, *et al*., 2002; Othman, 2014).

$$\text{Relative Importance index (RII)} = \frac{\sum W}{A \times N}$$

Where,

W = Scores awarded to a variable ranging from 1 to 4 where '1' is the least and '4' is the most important. A '0' rating is categorised as not applicable.

A = the highest score (4 in this instance)

N = total number of sample

According to Holt (2013), the above is the most cited RII formula. Although the calculations are quantitative, it should be noted that the sources of data are human

perceptions or opinions and are therefore wholly subjective (Holt, 2013). RII was calculated for the ideal intermediate skilled worker data as an alternative. Table 5.9 presents the RII for the individual attributes perceived as important to individual performance of construction intermediate skills. The attributes were classified as of high importance where RII was over 0.700; important if the RII was 0.40 – 0.70 and low significance if RII was below 0.40 (Othman, 2014). The attributes, rated highly by participants as being important for performance of construction skills as shown in Table 5.8 are: technical skills, underpinning knowledge, numeracy skills (cognitive); creativity, motivation and craftsmanship (emotional); and social skills, communication skills and a business-like attitude (social).

The results obtained from the RII analysis are consistent with the results obtained from the consensus on attributes evident in three categories of construction workers, (Table 5.8) thereby confirming the robustness of the selection process. As explained in section 4.6.11, the strategy for this aspect of the research was to elicit the personal attributes evident in high performing construction workers. Consequently, the study of the characteristics of those considered to be exemplars has led to a deeper understanding of expertise in vocational fields (Farrar and Trorey, 2008).

These results strengthen the argument for a holistic, whole person approach to learning which focuses not just on developing technical skills but also on the development of numeracy skills, emotional and social competencies and the continuous acquisition of relevant dynamic knowledge. These nine attributes were investigated further in the next phase of the research by examining the relationships and interdependencies of the attributes with individual performance at a granular level.

Table 5.9 Relative Importance Index (RII) of individual attributes for performance

Individual Attributes	2 ≤	≥ 4	Relative Importance		
			Total	Index	Rank
Technical skill	9	272	276	0.96	1
Knowledge	25	251	276	0.71	2
Creativity	66	216	276	0.71	3
Craftsmanship	134	142	276	0.46	4
Numeracy skills	160	116	276	0.47	5
Communication skills	142	134	276	0.46	6
Motivation	150	126	276	0.45	7
Social skills	154	122	276	0.43	8
Business-like attitude	157	118	276	0.42	9
Reliability	170	106	276	0.38	10
Technology	171	105	276	0.36	11
Responsibility	170	106	276	0.35	12
Integrity	177	99	276	0.34	13
ICT skills	189	87	276	0.32	14
Intellect	188	88	276	0.30	15
Emotional intelligence	185	91	276	0.28	16
Resourcefulness	194	82	276	0.27	17
Service orientation	194	82	276	0.24	18
Knowledge of materials	205	71	276	0.24	19
Learning skills	210	64	276	0.23	20
Self-control	221	55	276	0.19	21
Multi-skilled	230	46	276	0.17	22
Literacy levels	235	41	276	0.15	23
Perception	245	31	276	0.11	24
Openness	258	18	276	0.07	25
Individuality	271	5	276	0.02	26

5.2.5 Pedagogical Approaches

5.2.5.1 Learning Environment (learner perspective)

Participants who have at any time undergone constructions skills education and training (n = 167) were asked to respond to a separate section of the questionnaire which was designed to investigate the preferred environment, methods and contexts for the learning of construction skills using a 4-point rating scale. Table 5.10 shows the learning environments for construction skills listed in descending order of preference. Busy construction sites are the most preferred environment for the learning of construction skills while a combination of classroom and workshop is rated second most preferred while classroom combined with construction site is rated a close third. The classroom is rated lowest even below slow construction sites alone or workshop alone. These results support workplace learning theories which are based on the notion that learning is best effected within the context in which it is to be applied (Mulcahy, 2000; Harris, *et al.,* 2001; Rauner, 2007) and also on the suggestion that construction sites provide a rich arena for the learning of skills, experientially (Wang *et al.,* 2010; and Abdel-Wahab, 2012).

Table 5.10 Preferred learning environments for construction skills learning

Learning Environment	Mean Rating
Busy construction site	2.89
Classroom and workshop	2.56
Classroom and construction site	2.55
Workshop	2.48
Slow construction site	2.11
Classroom	1.86

5.2.5.2 Learning Approaches (learner perspective)

Participants identified approaches that worked for them in their learning of construction skills with the highest on the list being, working by themselves and then having discussions with the trainer on performance (coaching); watching the trainer do work; the use of drawing and sketching; and real life problem solving. Trial and error and imitation approaches ranked lowest on the list.

5.2.5.3 Learning Approaches (domain experts' perspective)

Given a generic list of teaching methods, the participants were asked to identify, rank and rate the ten most effective teaching methods for the learning of construction skills. Table 5.11 shows the selected teaching methods in descending order of effectiveness.

Table 5.11 Learning methods mapped to learning environments

		Learning Environment		
Selected Learning Methods	**Mean Rating**	**Classroom**	**Workshop**	**Construction Site**
Learning by being coached	3.68			√
Learning by drafting and sketching	3.50	√	√	√
Learning by watching	3.42		√	√
Learning through real world problem solving	3.00			√
Learning through critical thinking	2.77	√	√	√
Learning by listening, taking notes and remembering	2.75	√		
Learning by imitation	2.68			√
Learning through feedback	2.17	√	√	√
Learning through Virtual Technologies	2.10	√	√	√
Learning by reflection	1.87	√	√	√

KEY: A tick (**√)** indicates that a learning method was rated as appropriate for a particular learning environment

5.2.5.4 Learning Context (learner perspective)

The 167 participants (60.6%) who had some form of construction skills training were asked to characterise the context of their best learning experiences along specific lines and the following section summarise the findings. The age of the participants when they undertook training in an intermediate skill averaged between 16-25 years. Their motivation to learn came from a desire to learn new things, followed by a desire to learn and then by a desire to work with their hands. Most of the participants had basic education before commencing on the skills training.

Participants associated their effective skills learning experiences with trainers who were proficient in their skill, trainers who enjoyed imparting knowledge; trainers who had good background knowledge of their skills; trainers who were willing to answer questions; and trainers who had the ability to inspire. Participants found trainers who lacked interest in the skill; trainers who belittle trainees; and trainers who lacked teaching experience off putting. The construction site needs to have a friendly atmosphere and intermediate skilled workers need to be friendly and encouraging towards trainees for learning to take place. The sense of belonging to a community of practice is also essential for learning of construction skills on construction sites.

Participants in this segment of the study characterised the environment in which they effectively learned their construction skills as friendly and encouraging to learners (2.99), and having its own specific language which they were drawn into (2.93). An adequate supply of resources was found significant for effective learning (2.74).

5.2.6 Criteria for Evaluating Performance

From a given list participants were asked to identify, rank and rate appropriate criteria for evaluating performance of construction intermediate skilled workers and the findings are summarised in Table 5.12.

Table 5.12 Performance evaluation criteria identified, ranked and rated in order of preferences

S/No	Identified	Ranked	Rated
1	Efficient use of materials	Quality of output	Quality of output
2	Efficient use of tools/equipment	Efficient use of time	Efficient use of materials
3	Quality of output	Efficient use of materials	Efficient use of time
4	Teamwork	Efficient use of tools/equipment	Efficient use of tools/equipment
5	Efficient use of time	Teamwork	Teamwork
6	Attitude/behaviour	Attitude/behaviour	Punctuality
7	Ability to work under pressure	Punctuality	Attitude/behaviour
8	Quantity of output	Payment band	Ability to work under pressure
9	Extra responsibilities	Extra responsibilities	Payment band
10	Punctuality	Ability to work under pressure	Extra responsibilities

Quality of output, efficient use of materials, time and equipment, teamwork, punctuality, attitude/behaviour, ability to work under pressure, payment band and extra responsibilities were therefore selected as criteria for evaluating performance of intermediate skilled workers in the next phase of the study.

5.3 Construction Organisation Learning Environment Study

This aspect of the study was designed to explore the applicability of 66 WLD practices, distilled from literature, to construction firms in Nigeria. A questionnaire survey was considered most appropriate to obtain the perceptions of domain experts on the identified practices. The domain experts included construction managers employed in construction firms in Nigeria. All the construction firms (n=73) listed as full members of FOCI in Nigeria formed the sample for the study. The questionnaire (B) used for the study was developed based on findings from the literature review (see Chapter 3) The construction managers were asked to rate the items of workforce practices for importance in achieving WLD using a 5-point Likert scale. Details of the questionnaire development are in Section 4.6.2. A copy of the questionnaire is included in the appendix to this thesis (See Annex 2.3).

5.3.1 Response Rate

Table 5.13 details the responses to the WLD practices questionnaire survey. Essentially, 73 questionnaires were administered and 33 valid responses were recovered implying a 45.2% response rate which was considered adequate for this phase of the research.

Table 5.13 Response rate for construction organisation survey

No of Participants	No of valid responses	Response Rate
73	33	45.21%

5.3.2 Results and Analysis

The RII produces values ranging from 0.2 – 1.0. when a 5-point Likert scale is employed. Table 5.14 shows the RII values for the WLD activities of high significance, Table 5.15 shows significant practices and Table 5.16 shows practices of low significance.

The practices were classified based on Othman (2014) as:

High significance where RII was over 0.80 

Significant if the RII was 0.60 – 0.80 

Low significance if RII was below 0.60  (Traffic light colour code)

Table 5.14 WLD key practices (high significance)

Workforce practices	2 ≤	≥ 4	Relative Importance		
			Total	Index	Rank
Executive commitment to learning and developing	5	28	33	0.96	1
Strategic workforce planning	-	33	33	0.95	2
Alignment with business objectives	6	27	33	0.95	3
Culture of everyday learning and improvement	-	33	33	0.95	4
Personal responsibility for own L & D	1	32	33	0.95	5
Align individual career path with business goals	1	32	33	0.95	6
Provide informal learning opportunities	1	32	33	0.93	7
Custom design learning to specific needs	3	30	33	0.92	8
Reward and motivate individuals to learn	1	32	33	0.92	9
Formalise employee mentoring and coaching	3	30	33	0.92	10
Communicate business vision and goals	4	29	33	0.91	11
Provide variety of learning activities for workforce	4	29	33	0.90	12
Create a learning environment	2	31	33	0.90	13
Define workforce competencies, increase capacity	3	30	33	0.89	14
Employee engagement and sense of ownership	5	28	33	0.89	15
Continual discussion on how to improve	3	30	33	0.89	16
Develop a culture of innovation	6	27	33	0.89	17
Develop individual attributes	3	30	33	0.88	18
Technology for learning provision and knowledge generation, capture and diffusion	6	27	33	0.86	19
Provide employees with learning resources	2	31	33	0.86	20
Develop workgroups/teams	3	30	33	0.86	21
Automate labour data collection	7	26	33	0.85	22
Cross organisational communication	4	29	33	0.85	23
Provide learning spaces close to work	3	30	33	0.85	24
Learning options and resources on site	3	30	33	0.85	25
Manage career development programs	6	27	33	0.83	26
Generate real time labour metrics	3	30	33	0.82	27
Employee participation in organisation	4	29	33	0.82	28
Increase self-esteem, identity of workers	5	28	33	0.82	29
Create separate career track for trainers/coaches	10	23	33	0.82	30
Performance management	5	28	33	0.81	31

Table 5.15 WLD key practices (significant)

Workforce practices	2 ≤	≥ 4	Relative Importance		
			Total	Index	Rank
Integrate learning across organisation	8	25	33	0.79	32
Manage innovation	9	24	33	0.78	33
Manage learning and development costs	3	30	33	0.78	34
Knowledge management system	9	24	33	0.78	35
Establish performance baselines	7	25	33	0.77	36
Involve workers in decision making	6	27	33	0.77	37
Job-pairing	3	30	33	0.76	38
Provide overall training consistency	7	26	33	0.76	39
Recognition for contribution to business goals	7	26	33	0.75	40
Train internal trainers, mentors and coaches	8	25	33	0.75	41
360-degree feedback	7	26	33	0.75	42
Acquire the right talent	14	19	33	0.74	43
Feedback on employee contributions	5	28	33	0.74	44
Plan and organise individual learning	8	25	33	0.74	45
Standardise compensation and reward systems	7	26	33	0.74	46
Diffusion of technology across organisation	2	31	33	0.73	47
Culture of no blame for genuine mistakes, rather to focus on solving problems	6	27	33	0.73	48
HR practices	4	29	33	0.72	49
Provide workers with sufficient training	4	29	33	0.72	50
Reward success in learning and development	4	29	33	0.72	51
Exploit job rotation for multi skilling	5	28	33	0.71	52
Make information accessible to all	9	24	33	0.67	53
Provide workers with sufficient authority to meet goals	12	21	33	0.67	54
Open communication in real time	10	23	33	0.66	55
Re-employing retirees to coach and mentor	14	19	33	0.64	56
Ensure employment equity	14	19	33	0.64	57
Line management responsibility for learning	5	28	33	0.63	58
Worker participation in special project	12	21	33	0.61	59

Table 5.16 WLD key practices (low significance)

Workforce practices	2 ≤	≥ 4	Relative Importance		
			Total	Index	Rank
Partner with local institutions for certification	20	13	33	0.58	60
Partner with local institutions to add value	22	11	33	0.57	61
Succession management	22	11	33	0.57	62
Provide formal learning opportunities	24	9	33	0.53	63
Provide full or part-time temporary assignments	28	5	33	0.51	64
Partner with local institutions to validate on-the-job training	27	6	33	0.49	65
Flexible employment practices	33	-	33	0.44	66

The data collected from the construction firms on WLD key practices did not lend itself to factor analysis because a correlation matrix indicated very high correlations between variables. Also, the proportion of sample size to number of variables was considered too low for viable factor analysis (De Vaus, 2014). The 31 highly significant and 28 significant practices were rather categorised into 16 components through a process involving constant comparative analysis to group together WLD practices that appear to logically relate to one another (Saunders *et al*., 2016). Each of the derived components relates to an idea that is important to the research. In addition, the components were considered to be exhaustive and mutually exclusive (Chenail, 2012; Constas, 1992). Subsequently, the components and practices formed the basis for the semi-structured interviews within the case study organisations. Table 5.17 shows the 16 components and 59 WLD practices that constituted the sub-components at this stage of the research.

Table 5.17 Component and subcomponent ranking of WLD key practices

COMPONENTS	SUB-COMPONENTS	RII SUB-COMPONENT	RANK SUB-COMPONENT	RII COMPONENT	RANK COMPONENT
Strategic workforce planning				0.88	1
	Executive commitment to develop capability	0.96	1		
	Developing a strategic workforce plan for organisation's workforce	0.95	2		
	Define work competencies and develop workforce in the competencies strategic to business	0.89	3		
	Ensuring the diffusion of technology across levels, projects and functions	0.73	4		
Workforce practices				0.72	16
	Provide separate career track for trainers and coaches	0.82	1		
	Recruit talented people to fill positions	0.74	2		
	Standardise compensation and reward systems and deploy as incentives for desired performance	0.74	3		
	Establish staffing, compensation and information management practices	0.72	4		
	Ensure employment equity	0.64	5		
	Establish line management responsibility for learning and development of subordinates	0.63	6		
Learning spaces				0.85	4
	Provide learning spaces close to work areas possibly exploiting IT capability	0.85	1		

Table 5.17 Component and subcomponent ranking of WLD key practices (cont'd)

COMPONENTS	SUB-COMPONENTS	RII SUB-COMPONENT	RANK SUB-COMPONENT	RII COMPONENT	RANK COMPONENT
Communication and coordination				0.80	10
	Communicating business vision and goals to all levels and across projects and functions	0.91	1		
	Promoting cross divisional dialogue, and continual discussions to improve performance	0.89	2		
	Promoting cross organisational communication, vertical and horizontal	0.85	3		
	Making information accessible to all	0.67	4		
	Increase line of sight and visibility across the whole organisation; open communication in real time	0.66	5		
Learning culture				0.88	1
	Developing a culture of everyday learning and continuous improvement	0.95	1		
	Creating a learning environment, social and physical structures as well as learning resources	0.90	2		
	Developing organisation's knowledge management systems	0.78	3		

Table 5.17 Component and subcomponent ranking of WLD key practices (cont'd)

COMPONENTS	SUB-COMPONENTS	RII SUB-COMPONENT	RANK SUB-COMPONENT	RII COMPONENT	RANK COMPONENT
Learning resources				0.78	14
	Design customised learning programs that specifically address identified workforce needs	0.92	1		
	Provide employees with sufficient resources to pursue goals	0.86	2		
	Exploit technology for learning provision and knowledge generation, capture and diffusion	0.86	3		
	Plan, monitor and control cost of providing learning and development programs for workers	0.78	4		
	Training internal trainers, mentors and coaches	0.75	5		
	Provide employees with sufficient training to pursue goals	0.72	6		
Integration				0.81	7
	Integrating learning across projects, functions and business units	0.79	1		
	Providing overall training consistency	0.76	2		

Table 5.17 Component and subcomponent ranking of WLD key practices (cont'd)

COMPONENTS	SUB-COMPONENTS	RII SUB-COMPONENT	RANK SUB-COMPONENT	RII COMPONENT	RANK COMPONENT
Employee involvement				0.79	13
	Encourage employee engagement and sense of ownership of the business	0.89	1		
	Encourage worker participation in the organisation at all levels	0.82	2		
	Involving all workers in decision making at their levels or competence	0.77	3		
	Provide employees with sufficient authority to pursue goals	0.67	4		
Project workforce development				0.77	15
	Provide informal learning on project sites	0.93	1		
	Generate real time metric on labour data to make projections and set targets	0.82	2		
	Establish baselines from which performance improvement efforts are progressed	0.77	3		
	Use job-pairing of less experienced with more experienced to increase capacity	0.76	4		
	Exploit job rotation to increase potential for multi-skilling	0.71	5		
	Worker participation in special projects to build capacity	0.61	6		
Managing individual learning				0.84	5
	Encourage individuals to take personal responsibility for their own learning and development	0.95	1		
	Reward success in learning and development	0.72	2		

Table 5.17 Component and subcomponent ranking of WLD key practices (cont'd)

COMPONENTS	SUB-COMPONENTS	RII SUB-COMPONENT	RANK SUB-COMPONENT	RII COMPONENT	RANK COMPONENT
Workgroups and teams				0.86	3
	Develop workgroups and teams to balance skill sets and increase capacity	0.86	1		
Manage project learning and innovation				0.80	10
	Formalise employee mentoring and coaching	0.92	1		
	Develop a culture of innovation in the organisation	0.89	2		
	Provide learning options and resources appropriate for construction sites	0.85	3		
	Establish mechanisms for managing innovation	0.78	4		
	Culture of no blame for genuine mistakes, rather to focus on solving problems	0.73	5		
	Re-employ retirees to coach and train	0.64	6		
Individual worker career development				0.84	5
	Align individual career progression with business objectives	0.95	1		
	Manage career development programmes for all staff at all levels	0.83	2		
	Plan and implement learning activities aimed at agreed growth targets of individual workers	0.74	3		

Table 5.17 Component and subcomponent ranking of WLD practices (cont'd)

COMPONENTS	SUB-COMPONENTS	RII SUB-COMPONENT	RANK SUB-COMPONENT	RII COMPONENT	RANK COMPONENT
Whole person development				0.81	7
	Develop individual worker's capabilities to learn effectively	0.88	1		
	Increase the self-esteem of workers, giving them identity and a sense of belonging and purpose	0.82	2		
	Reward and motivate individuals to learn and to perform	0.72	3		
Performance management				0.80	10
	Automate labour data collection and analysis	0.85	1		
	Institutionalise performance management as a people management function	0.81	2		
	Provide 360-degree feedback to workers to encourage improvement	0.75	3		
Alignment				0.81	7
	Ensure the alignment of learning, development and performance with business objectives	0.95	1		
	Provide feedback on employee contributions to business goals	0.75	2		
	Provide recognition for contribution to business goals	0.74	3		

5.4 Summary

This chapter presented the results of the preliminary exploratory studies for this research which had five objectives: to characterise the Nigerian construction environment for knowledge requirements at intermediate skill levels; to evaluate the existing supply systems for intermediate skills learning; to explore the attributes that contribute to effective learning and performance of an individual; and the factors that contribute to effective learning and performance in the construction workplace environment.

The appropriate criteria for assessing performance of workers at this level was also explored to provide the rubrics for measuring performance in the next phase of the research. The generic factors identified from literature in these five areas were examined in the Nigerian construction environment for contextualisation and applicability. The investigations were carried out through nationwide questionnaire surveys in Nigeria to synthesise the perception of construction domain experts.

The key findings were that the Nigerian construction industry requirements for knowledge were Taylor-Fordist but with tendencies towards knowledge age requirements. This research therefore proceeded with the assumption that the Nigerian construction industry was positioned for the continuous improvement and/or transformation required by the knowledge age systems. The research also found that out of the ten skill supply systems evaluated, the informal apprenticeship system provided the most skills in terms of numbers to construction sites but was ranked ninth in quality. This is consistent with the findings from other studies (Awe *et al.,* 2009; Medugu *et al.*, 2011). Construction firms were perceived to provide the best

construction skills learning systems within Nigeria. The structured approach to WLD within construction firms proposed by this research is expected to improve on the quality and quantities of intermediate skills supplied to firms and ultimately to the industry.

The individual attributes identified for further study in relation to individual learning and performance in the construction workplace were: social attributes (communication skills, social skills and business-like attitude); emotional attributes (creativity, craftsmanship (pride in work) and motivation); and cognitive attributes (numeracy skills and GMA). To deepen understanding and applicability of these factors, further investigations were carried out within selected case study construction firms in Nigeria. The case study research design selected for the next phase of the research was to study the interplay of individual learning and the construction workplace within context. The case study evaluations are presented in Chapter Six.

CHAPTER 6 CASE STUDY EVALUATIONS

6.1 Introduction

This chapter reports on the results and analysis of in-depth case studies of three construction firms in Nigeria. The studies were conducted to further deepen understanding of the determinants of effective individual learning and performance, and the factors essential to building an effective construction workplace learning environment elicited through the preliminary exploratory studies carried out and reported in Chapter 5. This enabled the development of a learning and development optimising solution for construction firms. This solution was found in a complex pattern of results involving these three inter-related dimensions of construction organisations:

- Ability or inability to improve individual workers' learning effectiveness and to optimise individual performance
- Ability or inability to improve the construction firms' workplace learning effectiveness and efficiency
- Ability or inability to channel workplace learning and performance towards achieving business objectives

A resolution of these would either strengthen or support the argument that an organisation can create an environment that promotes and supports individual worker learning such that the learning is channelled towards achieving the organisation's business objectives. The case studies therefore further investigated the attributes for individual learning and performance within the firms' workplace context and the firms' learning environment context.

This resulted in an embedded (nested) research design involving psychometric assessments, interviews and document analysis. Three construction firms were involved in the multi-case studies and a cross case synthesis was produced to integrate findings. These finding facilitated the development of a conceptual learning and development model in the next phase of the research.

Comprehensive studies within each construction firm covered the two units of analysis, the individual worker learner and the construction firm learning environment. The individual worker learner studies involved psychometric assessments of significant individual attributes and correlating the assessments with individual performance assessments. The construction firm aspect of the case study involved in-depth semi-structured interviews designed to deepen understanding of the underlying issues in WLD and the concomitant influence on performance.

6.2 Case Study Firm 1 (CS1)

CS1 is a large construction firm with expertise, capacity and experience in handling complex building and engineering projects in all geopolitical zones in the Nigeria. CS1's characteristics, profile, strategic direction and workforce challenge are detailed in Table 4.6 and in Section 4.7.2.1. A total of 15 working days over a period of six weeks between March/April 2015 were spent collecting data (psychometric tests and interviews) from CS1. The following sections detail the procedures, results and analysis of the individual worker learner studies and organisation leaning environment studies within CS1.

6.2.1 Psychometric Assessments of Individual Attributes

6.2.1.1 Approach

The attributes assessed were limited to creativity, craftsmanship (pride in work), motivation, communication skills, social skills, business-like attitude, numeracy skills and GMA. The relationship between these attributes and 360^0 individual performance assessments were also determined. Five active sites of the firm were visited and all intermediate workers at work on the site were invited to participate. The site supervisors allowed time off work to each worker who was willing to participate in the study. Timings were staggered to minimise disruption to regular progress of work. Participants were given ID numbers starting with CS1/ to preserve anonymity. The psychometric tests took participants about an hour and a half to complete and was carried out during normal working hours while the performance assessments were completed after hours.

A total of 97 intermediate skilled workers fully participated in the study. Full participation meant that each participant completed all the psychometric tests and four sets of performance assessment forms were completed for the participant (1 self, 2 peers and 1 supervisor). Where any one of these questionnaires was left uncompleted by or for a participant, the participant was not included in the study. 14 participants were eliminated from the study for this reason.

The intermediate skills covered a wide range of skills namely, carpenters, masons, painters, plumbers, welders, iron benders, tower crane operators, batching plant operators, soil technicians, aluminium workers and plant and equipment maintenance technicians.

6.2.1.2 Results and analysis

Nonparametric statistical tests were considered appropriate for the data considering that Likert type questions were used for data collection which yielded ordinal or rank type data rather than interval or ratio data. Initial exploration of the data indicated the presence of outliers further supporting the use of Spearman's correlation coefficients in examining the relationships between variables considering that Spearman's rho is not sensitive to outliers.

The relationship between the individual attributes and performance were explored by computing correlations that focused on:

- The relationship between each individual attribute on each of the 14 elements of performance and on overall performance
- The relationship between the intrinsic motivation to learn on performance

Table 6.1 outlines the individual attributes and performance factors involved in the study while Table 6.2 shows a correlation matrix of CS1 individual worker attributes and performance factors

Table 6.1 List of attributes and performance factors

Code	Individual Attributes	Code	Performance Factors
A1	Communication skills	P1	Positive attitude
A2	Social skills	P2	Quality of work
A3	Business-like attitude	P3	Efficiency in use of materials
A4	Creativity	P4	Efficiency in use of time
A5	Craftsmanship (pride in work)	P5	Superior equipment and tool selection
A6	Motivation	P6	Technical skill
A7	Numeracy skills	P7	Effective team working
A8	GMA	P8	Cooperative working and sharing of information
		P9	Listens carefully and responds thoughtfully
		P10	Positive relationship with co workers
		P11	Avoids being late of absent
		P12	Ability to work under pressure
		P13	Attains high levels of productivity
		P14	Willingly accepts additional responsibility
		P15	Overall performance

Table 6.2 Correlation matrix of CS1 intermediate workers' attributes and performance factors

	A1	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**
P1	0.144	0.213	0.026	0.481**	-0.084	0.271**	0.085	0.103
P2	0.270*	0.205*	-0.042	0.145	0.182	0.173	0.036	0.148
P3	0.048	0.158	0.044	0.193	0.204*	0.252*	0.288**	0.350**
P4	0.205*	0.284**	0.190	0.226*	0.219*	0.306*	0.381**	0.381**
P5	-0.002	0.027	-0.084	0.299**	-0.181	0.021	0.049	-0.025
P6	0.170	0.245*	0.139	0.351**	0.255**	.307**	0.325**	0.376**
P7	0.276**	0.302**	0.156	0.371**	0.271*	0.248*	0.196	0.359**
P8	0.226*	0.393**	0.179	0.393**	0.152	0.379**	0.363**	0.391**
P9	0.241*	0.332**	0.236*	0.279*	0.256*	0.150	0.245*	0.346**
P10	0.267**	0.369**	0.194	0.553**	0.250*	0.140*	0.038	0.237**
P11	0.204*	0.284**	0.031	0.194	0.051	0.086	0.087	0.197
P12	0.156	0.264*	0.000	0.176	0.186	0.146	0.107	0.162
P13	0.348**	0.276**	0.146	0.356**	0.220*	0.042	0.108	0.109
P14	0.205*	0.204**	0.005	0.280**	0.192	0.285**	0.257*	0.276**
P15	0.331*	0.484**	0.181	0.511**	0.203*	0.318**	0.302**	0.432**

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

The strong significance of the relationship between GMA and almost all the elements of performance and overall performance is in line with previous studies which have established cognitive ability as a predictor of performance (Ferris *et al.* 2001). Motivation has also been established as a contributor to performance. The significant relationships of numeracy skills, creativity, social skills, communication skills and craftsmanship in relation to performance of this category of workers suggest that other attributes beyond the cognitive may be necessary for improving individual performance.

This may support the notion that a whole person approach to learning and development for intermediate skilled workers may be of benefit.

To further understand the influence of motivation on performance, the motivation attribute was unbundled to sub scale level allowing a study of the correlations between motivation types and performance. Table 6.3 shows the motivation subscales employed in this aspect of the study. The performance factors and their codes remain the same.

Table 6.3 Motivation subscales

Code	Motivation subscales
M1	Intrinsic motivation to know
M2	Intrinsic motivation towards accomplishment
M3	Intrinsic motivation to experience stimulation
M4	Extrinsic motivation identified
M5	Extrinsic motivation introjected
M6	Extrinsic motivation external regulation
M7	Amotivation

Source: (Guay, et al., 2003)

Table 6.4 Correlation matrix of CS1 intermediate workers' motivation and performance

	M1	M2	M3	M4	M5	M6	M7
P1	0.231*	0.151	0.078	0.166	0.026	0.232*	-0.029*
P2	0.104	0.239*	0.267**	0.244*	-0.022	0.152	0.019
P3	0.194	0.134	0.165	0.162	-0.030	0.135	-0.224*
P4	0.329**	0.115	0.176	0.280**	-0.063	0.141	-0.250*
P5	-0.021	0.083	-0.026	-0.040	0.016	0.081	0.192
P6	0.272**	0.085	0.191	0.233*	-0.064	0.279**	-0.195
P7	0.344**	0.084	0.118	0.177	-0.152	0.151	-0.314**
P8	0.321*	0.192	0.188	0.390**	-0.046	0.178	-0.345**
P9	0.181	0.129	0.128	0.202*	-0.240	0.098	-0.201*
P10	0.184	-0.022	0.009	0.128	-0.111	0.028	-0.344**
P11	0.076	0.076	0.222*	0.016	-0.146	-0.067	-0.249*
P12	0.091	0.097	0.208*	0.034	-0.005	0.066	-0.183
P13	0.114	-0.075	-0.054	0.036	-0.201*	-0.013	-0.074
P14	0.289**	0.148	0.179	0.133	-0.001	0.253*	-0.121
P15	0.332**	0.177	0.188	0.245**	-0.130	0.205*	-0.313**

**

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

The motivation attribute unbundled and then correlated with performance factors shows that the intrinsic motivation to know is more significantly correlated with performance than all the other forms of motivation measured. Amotivation as expected correlated with performance negatively. i.e. the more the amotivation the less the performance.

6.2.2 Interviews

6.2.2.1 Approach

Semi structured interviews were conducted at the firm's head offices in Abuja and at the construction sites visited. Questions asked were aimed at gaining deeper insight into the organisation's WLD system, and to relate the system to the key areas that emerged from the exploratory studies. These key thematic areas are outlined in the interview schedule in Annex 3.2 of the Appendix. The interviews lasted between 20 minutes and 2½ hours. Efforts were made to avoid the possibility of bias stemming from either the researcher or the participant. Researcher bias was abated by open and non-leading questions. Participant bias was controlled through analysing the interviewees' thinking into theoretical themes from literature which were further contextualised for the construction domain. In addition, the following corporate documents were collected and analysed: organisational charts; advertisement for construction artisans/tradesmen (indicating minimum job requirements); learning evaluation forms; performance evaluation templates; health and safety policy guidelines; and samples of standard operating procedures.

Interviewees were drawn from management, HR division, supervisors, professional staff and technical staff. Interviews were continued until saturation was reached at a total of 42 interviews (Bowen, 2008; Cresswell, 2013; Glasser and Strauss, 2009; Saunders *et al.,* 2016). Table 4.8 shows CS1 interview distribution. Data analysis involved exploring and describing the themes and patterns revealed in the interviews and firm documents. Constant comparative principles were employed.

6.2.2.2 Interview Findings

The perceptions and opinions of interviewees have been synthesised during analysis using constant comparative principles, but where relevant, the opinions of specific interviewees have been highlighted. Interviewees have been anonymised as much as possible to meet confidentiality requirements.

WLD is acknowledged as important to the organisation but not much attention has been given to it until recently. CS1 approach to WLD has remained unstructured, unstandardised and unsystematic. Although the organisation has a HR division, its activities have been limited to basic workforce practices such as staffing, compensation and promotion. In other key areas, such as strategic workforce development and performance management, processes have remained ad hoc over the years. The next section will summarise research findings in the key WLD areas, details can be found in Annex 3.3, a thematic matrix of CS1 interview findings.

The current state of WLD in CS1 has been attributed to the fact that in its forty years of existence the organisation has had to chart its own growth path, considering that there are very few older construction organisations in Nigeria against which CS1 can benchmark its processes. Furthermore, as noted by a member of top management, “In terms of human capital development, the sector is generally lacking”. CS1 is currently in the process of attaining ISO 9001 certifications of which continuous WLD is a strategic part. To meet the requirements for certification, CS1 is working on implementing a quality management system (QMS) that is expected to include a WLD system.

From the perspective of management therefore there was a clear understanding that WLD is critical to the organisation's survival. Top management was, however, polarised in how to approach the problem with regards to intermediate skills. The options were to either continue with the ad hoc approach to accommodate the cyclical nature of construction activity or to put in place a system that continually adapts to changes in the business environment, technology, knowledge and innovation. The proponents of the later view argue that if the organisation is going to remain a big player in the Nigerian construction sector it would need to put in place a comprehensive WLD system. The opinions of interviewees on the following key areas of WLD in relation to CS1's currents state, challenges, approaches and courses of action are discussed in the next sections: strategic workforce planning; workforce practice; learning environment; project WLD; individual learning and development; training; performance management; and alignment.

The interviewees note that strategic workforce planning is currently limited because CS1 has not developed a systematic process to follow. They also note that there are no labour metrics to base the plans on. Even though the cyclical nature of construction activity and the notion that the labour force is transient have been seen as barriers to strategic workforce planning, some interviewees argue that CS1 maintains long term relationships with its intermediate skilled workers and cannot be considered a transient workforce. Currently, CS1 maintains a database of the competencies held by its workforce. The database is in the process of being automated.

During periods of low construction activity, the organisation strives to retain their most experienced workers, giving them light duties to perform until there is a need for them

on a project site. For others, they have a policy called “stood-off” whereby a worker no longer comes to work but is paid 50% of his salary and other allowances for which they are expected to resume work almost immediately when recalled. For others who are made completely redundant during such periods, they remain in the database and are given first chance to return to the company when construction activities pick up before the organisation places adverts for fresh recruitment. This policy explains the length of years of service that intermediate skilled workers attain in CS1 (13 years average).

An automated database of construction workers combined with labour metrics was suggested as a means of building up the data needed for systematic workforce planning and development. Interviewees note that to date, top management’s first reaction to filling the position of a manager to deliver a new project is to get a competent person from Germany or Asia. The interviewees argued that competence can be developed in house if a structured approach to WLD is adopted by CS1.

Workforce practices have been limited in scope to staffing, compensation and promotion and even these have not been standardised. For instance, recommendations for recruitment and promotion are at the total discretion of supervisors with no specified factors on which recommendations are based. Interviewees agreed that there is no performance management system in place in CS1, however, the QMS being developed by CS1 is expected to incorporate a performance management system.

Interviewees described the learning options available in the organisation and these can be categorised as formal and informal learning. Formal learning is made up of ITF training programmes, in-house training programmes organised by the HR department

(usually on health and safety), one-off training programmes to develop specific skills required by a specialist worker, and training offered by material, component, equipment and tool suppliers. CS1 statutorily contributes to Nigeria's Industrial Training Fund (ITF). CS1 bases its annual training plan on the generic courses provided by ITF. These courses are best suited to head office administrative staff rather than technical staff.

Interviewee responses indicate that the actual training needs of staff to meet organisational goals are not a consideration in drawing up the training plan but rather the ITF training programme and the demands of the unions for training are the only considerations. In addition, the training offered by ITF was considered too theoretical and not suited to a work oriented organisation. An interviewee (management) considered the CS1 supervisors as ideal for providing formal training in intermediate skills but would find it difficult to schedule those into their busy schedules. The interviewee suggested that the organisation may "have to think of a way to structure theoretical learning and practical learning into the project work schedule." The National Consultative Employment Association (NECA) also organises generic training programmes to which the organisation subscribes.

Most of the intermediate and junior staff interviewed do not see a link between the attending the formal training programmes and improving their capabilities so that the organisation benefits. Rather they see training as a personal fringe benefit while the trade union leaders view it as a workers' right. Interviewees in management accept this and go along with it and no effort is made to link the content of training to the needs of the business. Interviewees from HR, however, argue that the health and safety training has resulted a reduction of the number of accidents on project sites and on the roads.

On the question of workers' awareness of the organisation's vision, mission and goals, none of the interviewees knew what it was or had ever seen a document with the mission statement. No interviewee had also been involved in any exercise or activity to align processes to the strategic objectives of the business. An interviewee (HR), however, argues that employee involvement and alignment will be taken care of with the proposed QMS.

According to interviewees, informal learning is taken for granted and is handled by line managers who are interested and undertaken by workers who show an interest. Line managers are left to their own devices and methods as far as developing their subordinates are concerned. The interviewees' responses suggest that CS1 does not provide support for, nor do they channel informal learning towards achieving organisational goals. The organisation does not accept responsibility for facilitating the process of learning and development beyond promoting the learner from labourer to artisan/technician, to headman, to foreman, to deputy supervisor and then supervisor based on their individual ability to learn and develop themselves.

The supervisor is the most senior person on each site and works under a project manager who manages several sites. According to interviewees, much of learning and development is achieved by other construction workers imparting their experience to less experienced workers. Workers at all levels, "learn by doing". Workers, however, own the responsibility for their own learning. Interviewees acknowledge that self-directed learning is the main driver of workforce learning in CS1. Most of the time, workers rely on self-sponsored development to meet their personal career development goals.

According to interviewees, the QMS policy that the organisation is developing requires that each worker continuously looks for ways to improve on the work they do. The organisation tries to maintain a mix of highly competent staff and less competent and less experienced staff in each section of the organisation such that the later "understudy" the former group. The organisation occasionally "reshuffles" the staff so that competencies are broadened and "workers thinking is challenged". An interviewee described coaching and mentoring activities through which learning is disseminated in their department. This approach is still unstructured and is not wide spread throughout the organisation. The organisation provides learning resources in the form of books, manuals and operating procedures. The organisation provides internet access to all workers which is an endless source of knowledge.

From the perspective of management interviewees, a barrier to individual learning and performance on the job is the poor educational levels of entrants into the workforce. Basic education remains poor and even though there has been improvement in literacy skills, basic knowledge of science and mathematics which is of great relevance to technical professions limits the workplace learning options available to the organisation. Interviewees (supervisor) considers the capabilities of intermediate skilled workers in Nigeria narrow when compared to the intermediate skilled workers in Germany who possess skills in more than one area. He suggests that better educated workers should be employed at each level of the organisation and this would make imparting on-the-job learning easier and more effective.

A third problem identified was attitudinal. Interviewees (management) perception is that the majority or workers need close supervision to be productive. According to a

management interviewee, “They disappear or sit around and performance drops by 50 to 60% if nobody is standing there and permanently watching them”. On the question of whether this problem can be addressed through learning that is focused on improving attitudes and increasing motivational levels, the interviewees’ opinion was that “training cannot ultimately fix” the problem, rather, “take somebody who wants to work and train that person” in the technical skills. Another interviewee (HR), however, saw some benefit in identifying the gaps in workers who do not show interest in learning or who are underperforming and providing varied learning opportunities to give them a chance to improve. Balancing the cost of delivering learning with the value of performance improvement is, however, essential. Other interviewees argued that the worker attitude to work is understandable considering the long hours of work and the conditions under which they must work. The suggestion was that better working conditions negotiated with the workers may improve performance. HR, however, insists that the long hours of work are not negotiable due to client deadlines and weather conditions.

On the issue of social structures, interviewees acknowledged that the organisation allows the informal development of work groups and respects them in the allocation of work for as long as it does not conflict with achieving business objectives. The organisation, however, does not deliberately develop work groups for the purpose of building capacity. Interviewees noted that work groups have developed informally but in many cases along lines that are detrimental to the organisations goals. For instance, some groups develop so that members can cover for themselves. Management has therefore discussed forcing the composition of workgroups to counter the trend. Interviewees also suggested that high performers and less competent workers should

be mixed together in work groups to allow for capacity building by providing role models for others to emulate.

Workers at intermediate level join the organisation workforce as either fully trained skilled workers or as labourers. Some form of practical test as well as an interview are conducted to determine the candidate's level of skill and willingness to learn. When employed, they are assigned to an experienced headman who is responsible for their induction and subsequent training. The duration of training depends on individual interest and ability. Some interviewees claim that It takes a novice between 6 months to 1½ years to become fully trained while for others it takes a minimum of 2 years to become an intermediate skilled worker. The organisation has experimented with employing a large number of engineering graduates as foremen and guided them though a course of practical training, a proportion of them are now competent supervisors.

Interviewees (supervisor) discussed performance monitoring and evaluation to assess the impact of training of the workforce. Evaluation is not just for technical skill but encompasses relationship with other workers and attitude to work. An interviewee suggested special recognition and encouragement for high performers. This is expected to inspire others.

6.2.3 Summary of CS1 Findings

From the insights gained from the interviews outlined in the previous section, WLD practices are applicable to CS1. The interviewees indicated that a wide range of them were already practised albeit inconsistently and practice was not widespread. Further

analysis shows that 22% of the 59 significant practices are practiced by CS1 but not consistently, 71% have widespread acceptance in principle but not practiced while 7% of practices do not have widespread acceptance and are not practised. Table 6.9 is a cross case matrix showing the dispositions of CS1, CS2 and CS3 to the workplace learning and development practices while Table 6.10 is the cross-case matrix showing the disposition of the three case study firms towards the WLD components (groupings of the 59 practices). All 16 components are accepted as important for WLD in CS1, while 4 are practised though not consistently or in a structured manner (see Table 6.10).

Significantly, self-directed learning was described as the main driver of WLD in CS1. For an individual to apply themselves to learning while working (performing) requires capabilities that go beyond the cognitive to encompass the emotional and the social. For instance, the emotions, motivation and decision to learn provide the mental energy for learning and what is learned is influenced by the character and intensity of that mental energy (Illeris, 2007). This is perhaps demonstrated by the average "motivation to know" score of 80 (highest possible score 100) for this cohort of workers. In addition, Spearman's correlation rho was considered significant at $r = 0.332$, $p \leq 0.001$.

6.3 Case Study firm 2 (CS2)

A total of 7 working days over a period of six weeks between March/April 2015 were spent collecting data (psychometric tests and interviews) from CS2.

6.3.1 Psychometric Assessments of Individual Worker Attributes

Five active construction sites of the firm were visited, the head office in Abuja and 4 sites in Anambra State of Nigeria. All intermediate workers at work on the site were invited

to participate. Some participants completed the assessments during their lunch break, while others stayed back after close of work to complete the assessments. Participants were given ID numbers commencing with CS2/ to preserve anonymity. A total of 45 intermediate skilled workers fully participated in the study. The intermediate skills covered a wide range of skills namely, carpenters, masons, painters, plumbers, welders, iron benders, tower crane operators and asphalt plant operators and plant maintenance technicians.

Table 6.5 shows a correlation matrix of CS2 individual worker attributes and performance factors where:

A1 Communication skills
A2 Social skills
A3 Business-like attitude
A4 Creativity
A5 Craftsmanship (pride in work)
A6 Motivation
A7 Numeracy skills
A8 GMA
P1 Positive attitude
P2 Quality of work
P3 Efficiency in use of materials
P4 Efficiency in use of time
P5 Superior equipment and tool selection
P6 Technical skill
P7 Effective team working
P8 Cooperative working and sharing of information
P9 Listens carefully and responds thoughtfully
P10 Positive relationship with co workers
P11 Avoids being late of absent

P12 Ability to work under pressure

P13 Attains high levels of productivity

P14 Willingly accepts additional responsibility

P15 Overall performance

Table 6.5 Correlation matrix of CS2 intermediate workers' attributes and performance factors

	A1	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**
P1	0.249	-0.023	0.317*	0.474**	0.412**	0.717**	0.273	0.701**
P2	0.459**	0.250	0.393**	0.451**	0.327**	0.190	0.341*	0.031
P3	0.730**	0.102	0.570**	0.564**	0.318*	0.675**	0.595**	0.445**
P4	0.624**	-0.229	0.559**	0.419**	0.329*	0.811**	0.689**	0.744**
P5	0.324**	-0.279	0.593**	0.435**	0.396**	0.626**	0.415**	0.509**
P6	0.221	-0.044	0.359*	0.441**	0.295*	0.632**	0.242	0.658**
P7	0.422**	-0.456**	0.304*	0.275	0.040	0.705**	0.535**	0.636**
P8	0.316*	-0.019	0.162	0.352*	0.222	0.734**	0.441**	0.756**
P9	0.449**	-0.135	0.341*	0.234	0.193	0.838**	0.693**	0.798**
P10	0.402**	-0.008	0.542**	0.393**	0.248	0.849**	0.569**	0.830**
P11	0.556**	0.098	0.354**	0.357**	0.279	0.615**	0.614**	0.607**
P12	0.323*	0.444**	0.405**	0.469**	0.456**	0.347*	0.082	0.327*
P13	0.125	0.049	0.411**	0.238	0.406**	0.484**	0.273	0.503**
P14	0.391**	0.032	0.464**	0.520**	0.223	0.690**	0.548**	0.592**
P15	0.347*	-0.178	0.512**	0.346**	0.179	0.733**	0.527**	0.679**

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

GMA has been established in literature as a predictor of performance (Ferris *et al.*, 2001). Motivation has also been established as a contributor to performance. The results from the CS2 studies agree with theory in this regard. Furthermore, for this cohort of

workers in this organisation, communication skills, a business-like attitude, creativity and numeracy skills are positively associated with overall performance. These results also support the concept of a whole person approach to WLD.

Table 6.6 shows a correlation matrix of CS2 individual worker motivations and performance factors.

Table 6.6 Correlation matrix of CS2 intermediate workers' motivation and performance factors

	M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**
P1	0.542**	0.398*	0.209	0.564**	0.390**	-0.208	0.250
P2	-0.097	-0.024	0.009	0.238	-0.055	0.145	-0.077
P3	0.436**	0.263	0.511**	0.106	-0.190	0.490**	-0.322*
P4	0.599**	0.498**	0.523**	0.386**	-0.065	0.444**	-0.148
P5	0.283	0.314*	0.222	0.300*	0.148	0.109	0.092
P6	0.477**	0.443**	0.048	0.582**	0.376*	-0.333*	0.318*
P7	0.576**	0.420**	0.507**	0.199	-0.145	0.235	-0.110
P8	0.583**	0.320*	0.420**	0.292	0.129	-0.062	0.036
P9	0.607**	0.498**	0.650**	0.219	-0.024	0.318*	-0.141
P10	0.491**	0.380**	0.435**	0.196	0.132	0.092	0.001
P11	0.292	0.354*	0.434**	0.021	-0.120	0.465**	-0.303*
P12	0.137	0.097	-0.181	0.454**	0.541**	-0.304*	0.407**
P13	0.171	0.276	0.022	0.638**	0.464**	-0.242	0.449**
P14	0.391**	0.303*	0.187	0.282	0.014	-0.042	-0.042
P15	0.544**	0.427**	0.400**	0.374*	0.159	0.133	0.007

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

The correlation between the intrinsic motivation to learn and overall performance is significant for CS2 workers who participated in the study, suggesting that learning and performance are positively linked.

6.3.2 Interviews

6.3.2.1 Approach

Semi structured interviews were conducted at the firm's head offices in Abuja and 4 construction sites in Anambra State of Nigeria. Questions asked were aimed at gaining deeper insight into the organisation's WLD system, and to relate the system to the key areas emerging from the exploratory studies. These key thematic areas are outlined in the interview schedule in Annex 3.2 of the Appendix. The interviews lasted between 20 minutes and 1½ hours. Efforts were made to avoid the possibility of bias stemming from either the researcher or the participant. Researcher bias was abated by open and non-leading questions. Participant and researcher bias were controlled as described in Section 6.2.2.1. In addition, the following corporate documents were collected and analysed: company profile; policy documents on training; organisational structure charts; and recruitment advertisements showing minimum job qualifications for intermediate skills to add depth to the information provided by interviewees.

Interviewees were drawn from management, the administrative department, professional staff, supervisors, and technical staff. Interviews were continued until saturation was reached at a total of 27 interviews (Bowen, 2008; Cresswell, 2013; Glasser and Strauss, 2009; Saunders *et al*., 2016). Table 4.9 shows CS2 interview distribution. Data analysis involved exploring and describing the themes and patterns

revealed in the interviews and firm documents. Constant comparative principles were employed.

6.3.2.2 Interview Findings

The perceptions and opinions of interviewees have been synthesised during analysis using constant comparative principles, but where relevant, the opinions of specific interviewees have been highlighted. Interviewees have been anonymised as much as possible to meet confidentiality requirements.

WLD is acknowledged as important to the organisation as evidenced by the emphasis placed on CPD. However, CS2 approach to WLD has remained unstructured, un-standardised and unsystematic. The HR function is carried out within the administrative department and their activities have been limited to basic workforce practices such as staffing, compensation, information recording and promotion. In other key areas, such as strategic WLD and performance management, processes have remained ad hoc over the years. The next section will summarise research findings in the key WLD areas. Further details can be found in Annex 3.4, a thematic matrix of CS2 interview findings.

The organisation's strategic objective is to grow into a large construction firm that operates at an international level. Specifically, they are focused on moving into construction in the oil and gas sector along the West African coast. The organisation would therefore require ISO certifications and a key element of the process of certification would require the development of a structured approach to human capital development within the organisation. The opinions of interviewees on the following key areas of WLD in relation to CS2's currents state, challenges, approaches and courses

of action are discussed in the next sections: strategic workforce planning; workforce practice; learning environment; project WLD; individual learning and development; training; performance management; and alignment.

CS2's approach to coping with the cyclical nature of construction activity in relation to workforce requirements is to maintain a core of highly trained technical staff as full-time employees and supplement with ad hoc staff drawn from a database of construction workers which the organisation maintains. The database comprises details of workers of proven competence whom CS2 has working experience of. On occasions where construction site location is remote, CS2 considers the use of either labour sub-contractors who are also on the database or workers local to the construction site. Even then, the organisation maintains long standing relationships with workers, an average tenure of 13 years for the CS2 workers who participated in this research. The challenges to strategic WLD for CS2 are no systematic process to follow, difficulty in fitting training into busy schedules, cyclical nature of construction and resulting mobile workforce, and difficulty in working out future workforce requirements. Interviewees agree that the organisation would benefit from a systematic process of improving capacity development that structures theoretical learning into project work schedules. Also, an automated database of construction workers and associated labour metrics would be beneficial in determining and planning for future workforce needs.

CS2 management supports self-directed learning efforts in the sense that it supports its staff in acquiring formal further education. Learning on the job is, however, not structured. Coaching and mentoring are explored but not formalised. Interviews confirm that the organisation employs high grade workers as a matter of policy. For instance, in

an advert for graduate engineer or other relevant employee, a pass grade of 2nd class upper division would be the minimum requirement. For a diploma, it would be an upper credit or a merit as the case may be. Interviewees are of the opinion that a negotiated system of WLD would be beneficial in motivating individual learning and development. CS2 deliberately composes work groups and teams to support capacity development. Interviewee are of the opinion that achieving synergy among group members is the main challenge.

Workforce involvement in the business has improved because organisation's objectives are communicated to the workforce and there is significant employee buy-in into the organisation's vision. Interviewees agree that worker opinions and inputs are respected in operational decisions. Formal learning comprises in-house training programmes organised by the administrative department, and material, component and equipment supplier training programmes. CS2 was still exploring modalities for benefiting from their ITF contributions either through generic ITF training programmes or customised training programs developed in-house to support the organisation's business objectives.

Informal learning within CS2 follows a similar pattern to CS1. It is taken for granted, handled by line managers who are not supported by the organisation in the process. Method, devices and outcomes are dependent on the interest levels of the mentor and/or the learner. Rewards and recognition for informal learning comes when the learner demonstrates learning through performance. Similarly, informal learning is ad hoc, inconsistent and is not channelled towards the organisation's strategic objectives. There is no knowledge management system in place in CS2, however, interviewees accept that it would be beneficial for WLD. Self-directed learning is again the driving

force for learning in the organisation with similar challenges and benefits as described for CS1.

CS2's approach to developing a conducive learning environment is to provide learning resources, internet access, and an open system which allows all staff access to information and knowledge sources. This learning component remains unstructured and limited according to interviewees and an appropriate course of action would be to put in place the necessary physical and social structures required, provide more learning resources and to source for good trainers, coaches and mentors. Interviewees also suggested structuring and standardising workforce practices in relation to staffing and performance management. CS2 interviewees (management) were of the opinion that learning is a continuous process and therefore provides support for human capital development. The organisation runs an "open system" which ensures that every member of staff has access to all the learning resources provided by the organisation, information, and knowledge. Management encourages the free flow of basic knowledge and information. Everybody is expected to learn continuously. According to interviewees, the social setting is communal.

6.3.3 Summary of CS2 Findings

The interviews outlined in the previous section, gave insights that indicate that WLD practices are applicable to CS2. Analysis of the interviews show that a wide range of them were already practiced albeit inconsistently and practice was not widespread. The analyses show that 1 of the 59 (≈ 2%) practices is accepted and practiced consistently by CS2, 22% are practiced but not consistently, 76% have widespread acceptance in principle but are not practiced (see Table 6.7). All 16 components are accepted as

important for WLD by CS2, while 4 are practiced though not consistently or in a structured manner (see Table 6.10).

Significantly, high grades were a requirement for employment in CS2 and by implication, the organisation was looking to employ workers with proven high mental ability. This was evident in the distribution of their technical workforce where 33% joined the organisation with first school leaving certificate compared with 80% in CS1 and 80% in CS2. This difference is also evident in the GMA scores recorded during the psychometric testing. Average GMA for CS2 was 32 (maximum score possible = 50). Whereas average score for CS1 was 21 and CS3 was 22. GMA as a predictor of job performance has been studied and well documented (Barros, *et al.,* 2014; Ferris *et al.,* 2001; Schmidt and Hunter, 2004). The high grades recruitment programme may have provided CS2 with a workforce of high mental ability which correlates significantly with performance at $r = 0.679$; $p \leq 0.001$. However, motivation for this cohort also correlate highly with performance at $r = 0.733$; $p \leq 0.001$. Ferris *et al.* (2001) studied the interaction between social skill and job performance and found that the relationship between GMA and job performance was stronger with workers with high rather than those with low social skills. Similarly, the relationship between social skills and job performance was stronger with workers with high GMA rather than those with low GMA. These interactions between attributes to achieve high levels of performance have been corroborated by other studies (Boyatzis and Ratti, 2009; Goleman, 2001; Illeris, 2007).

6.4 Case Study Firm 3 (CS3)

A total of 4 working days over a period of six weeks between March/April 2015 were spent collecting data (psychometric tests and interviews) from CS3.

6.4.1 Psychometric Assessments

Two active construction sites and the head office of the firm were visited, the head office in Kaduna and 2 sites in Kaduna and Minna respectively. All intermediate workers at work on the site were invited to participate. Some participants completed the assessments during their lunch break, while others stayed back after close of work to complete the assessments. Participants were given ID numbers commencing with CS3/ to preserve anonymity. A total of 21 intermediate skilled workers fully participated in the study. The intermediate skills covered a wide range of skills namely, carpenters, masons, tilers, painters, plumbers, welders, iron benders, electricians, and plant and equipment operators.

Table 6.7 shows a correlation matrix of CS3 individual worker attributes and performance factors where:

A1 Communication skills
A2 Social skills
A3 Business-like attitude
A4 Creativity
A5 Craftsmanship (pride in work)
A6 Motivation
A7 Numeracy skills
A8 GMA
P1 Positive attitude
P2 Quality of work
P3 Efficiency in use of materials
P4 Efficiency in use of time
P5 Superior equipment and tool selection
P6 Technical skill
P7 Effective team working

P8 Cooperative working and sharing of information
P9 Listens carefully and responds thoughtfully
P10 Positive relationship with co workers
P11 Avoids being late of absent
P12 Ability to work under pressure
P13 Attains high levels of productivity
P14 Willingly accepts additional responsibility
P15 Overall performance

Table 6.7 Correlation matrix of CS3 intermediate workers' attributes and performance factors

	A1	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**
P1	0.283	0.152	0.174	0.243	0.189	0.442*	0.293	0.269
P2	0.455*	0.099	0.255	0.372	0.197	0.349	0.321	0.374
P3	0.624**	0.213	0.392	0.354	0.365	0.284	0.181	0.358
P4	0.387	0.117	0.315	0.405	0.449*	0.512*	0.151	0.447*
P5	0.503*	0.153	0.275	0.636**	0.101	0.099	-0.216	0.138
P6	0.376	0.712**	0.715**	0.226	0.521*	0.500*	0.530*	0.675**
P7	0.098	0.380	0.285	0.498*	0.462*	0.564**	0.546*	0.569**
P8	-0.093	0.584**	0.355	0.010	0.589**	0.308	0.623**	0.469*
P9	0.244	0.026	0.268	0.165	0.154	0.548*	0.179	0.260
P10	0.212	0.564**	0.458*	0.358	0.647**	0.559**	0.399	0.726**
P11	-0.024	0.210	0.224	0.266	0.436*	0.509*	0.417	0.297
P12	0.181	0.308	0.437*	0.029	0.552**	0.648**	0.603**	0.551**
P13	0.263	0.521*	0.323	0.393	0.495*	0.495*	0.629**	0.699**
P14	0.448*	0.252	0.256	0.299	0.272	0.383	0.373	0.477*
P15	0.452**	0.543*	0.617**	0.426	0.756**	0.773**	0.487*	0.803**

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

The results from the CS3 studies agree with theory in relation to GMA and motivation being contributors to performance. Furthermore, for this cohort of workers in this organisation, a business-like attitude and craftsmanship correlate significantly with overall performance at 0.01 level, while communication skills, social skills and numeracy skills correlate with overall performance at 0.05 level. The results also support the concept of a whole person approach to WLD. Table 6.8 shows a correlation matrix of CS3 individual worker motivations and performance factors.

Table 6.8 Correlation matrix of CS3 intermediate workers' motivation and performance factors

	M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**
P1	0.331	0.367	0.314	0.270	-0.012	0.271	-0.471*
P2	0.364	0.198	0.220	0.230	-0.026	0.024	-0.577**
P3	0.566**	0.290	-0.016	0.111	-0.122	0.125	-0.276
P4	0.566*	0.492*	0.229	0.217	0.126	0.376	-0.478*
P5	0.172	0.166	-0.011	0.118	-0.038	-0.050	-0.103
P6	0.418	0.331	0.176	0.191	-0.228	0.535*	-0.465*
P7	0.283	0.397	0.488*	0.317	-0.051	0.426	-0.570*
P8	0.317	0.187	0.311	0.318	-0.459*	0.192	-0.343
P9	0.569**	0.548*	0.216	0.243	-0.101	0.223	-0.336
P10	0.423	0.361	0.309	0.352	-0.162	0.427	-0.516*
P11	0.640**	0.288	0.438*	0.405	0.114	0.145	-0.281
P12	0.516*	0.445*	0.273	0.439*	o.166	0.560**	-0.635**
P13	0.134	0.330	0.494*	0.244	0.096	0.487*	-0.556**
P14	0.287	0.255	0.015	0.118	0.054	0.358	-0.465*
P15	0.763**	0.570**	0.334	0.434*	-0.136	0.601**	-0.707*

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

The correlation between the intrinsic motivation to learn and overall performance is significant for CS3 workers who participated in the study, supporting the notion that learning and performance are positively linked.

6.4.2 Interviews

6.4.2.1 Approach

Semi structured interviews were conducted in Kaduna, Nigeria. Questions asked followed the same format as the CS1 and CS2 interviews described in Sections 6.2.2.1 and 6.3.2.1 respectively. The interviews lasted between 20 minutes and 2½ hours. Documents collected included in-house training manuals from one of the construction site offices visited. Interviewees were drawn from management, supervisors, professional staff and technical staff. Interviews were continued until saturation was reached at a total of 8 interviews (Bowen, 2008; Cresswell, 2013; Glasser and Strauss, 2009; Saunders *et al.,* 2016). Table 4.8 shows CS3 interview distribution. Data analysis involved exploring and describing the themes and patterns revealed in the interviews and firm documents. Constant comparative principles were employed.

6.4.2.2 Interview Findings

The organisation started business 30 years ago, as a small enterprise and its strategic objective is to grow into a medium sized construction firm. The organisation intends to remain competitive by offering high standards and quality of service and an excellent product. An interviewee (management) noted that developing a workforce that can deliver on these promises is critical to achievement. Interviewees agreed that the importance of quality in service delivery was emphasised to all staff from the moment

they join the organisation's workforce making it part of the organisation's lore and culture through constant repetition and practice.

According to the interviewees, the organisation's workforce learning development strategy was to continuously offer learning opportunities to all its workers, unskilled, semiskilled, skilled and managerial staff. Those who exploit the opportunities for learning and development are retained by the organisation for future projects. The organisation pays a "stipend" to maintain the relationship during periods when their particular skills are not required by the organisation. Interviewees agree that no effort is made by management to determine future workforce competency needs and to tailor learning and development towards meeting those needs. An interviewee noted that "learning is reactionary during busy periods and opportunistic during slow periods".

The interview findings suggest that the organisation is committed to the learning and development of individual workers. Typically for a small firm, a flatter structure prevails than with CS1 or CS2. The layers between top management and site workers are thin and are constantly breached resulting in an almost family atmosphere. Workers are treated as individuals rather than groups. There are no unions operating in the organisation. An individual who indicates an interest in learning, development and career growth is afforded a variety of opportunities to develop. Career progression is discussed and agreed with senior management and the organisation supports this mostly through mentoring and coaching on the job.

The opinion of interviewees is that work groups are functional and are mostly constituted in the form of trade gangs. Unskilled workers support the work of an

intermediate skilled worker to achieve project goals. Where an unskilled worker shows initiative, the intermediate skilled worker takes them on as an informal apprentice. Teams are rarely cross functional because of the limited size of the workforce. The interviewees agreed that workers in CS3 show a high level of involvement in the organisation in keeping with the "big family" atmosphere. For instance, all workers are given the opportunity to suggest an approach to different aspects of the work. Micro teaching sessions are a regular mode of extending knowledge and building capacity. These typically take place before the start of the day's work, or at the beginning of a new aspect of work.

Interviewees agree that many of the workers have been associated with the organisation for 20 - 30 years and have a strong sense of belonging. They "own" the organisation's achievements as well as its failures. Formal learning in the organisation is limited. For instance, professional staff who are usually sponsored to attend CPD events of relevant professional bodies. Safety training for all workers is also a feature in this area. Interviewees claim that informal learning accounts for over 70% of the learning in the organisation. It is largely unstructured but the top management would like this to change. They are in the process of capturing and storing their micro-teaching sessions so that the knowledge of their most experienced workers is not lost as they retire. Media used include videos and text in the form of standard operating procedures.

Self-directed learning is supported by CS3 and career paths are regularly agreed with individual workers who show interest in learning. Progress is monitored and continuous support is provided. According to interviewees, the scheme has been very successful only where the worker is motivated to learn. Prior learning in the form of numeracy and

literacy competence are also a determinant of how easily the worker learns. On the average, workers spend a minimum of three years from unskilled to an intermediate skilled worker. Interviewees claim that a strong learning culture pervades the organisation. Motivations to learn are quite high and there is always some micro teaching session going on at the construction site or in the office during slow periods. Everyday learning and improvement is part of the organisational culture. The learning is, however, designed to achieve short term objectives and not strategic ones. Approach is ad hoc and unstructured.

Interviewees confirm that the organisation does not have a HR department and workforce practices are not standardised. Recruitment for a project is carried out by calling up the core workers associated with the organisation and complementing with intermediate skilled workers from around the project location. Performance management is mostly ad hoc and not structured though interviewees (management) agree that it fundamental to improving WLD and alignment with the strategic goals of the organisation.

6.4.3 Summary of CS3 Findings

The interviews outlined in the previous section, gave insights that indicate that the WLD practices that emerged from the exploratory preliminary studies (See Chapter 5) are applicable to CS3. Analysis of the interviews show that a wide range of them were already practiced albeit inconsistently and practice was not widespread. The analyses show that 1 out of the 59 (≈ 2%) practices was accepted and practiced consistently by CS3, 30% are practiced but not consistently, 68% have widespread acceptance in principle but are not practiced (see Table 6.9). All 16 components are accepted as

important for WLD by CS2, while 5 are practiced though not consistently or in a structured manner (see Table 6.10). The flatter hierarchy, open communication, high employee involvement and sense of 'ownership' of the business may be evident in the significant relationship of the business – like attitude of CS3 workers with performance, $r = 0.617$; $p \leq 0.001$.

6.5 Cross Case Synthesis

6.5.1 Psychometric Assessments

6.5.1.1 Mix of individual attributes for workforce learning and performance

The three case study firms exhibit some differences in the correlation between individual attributes and overall performance. Figure 6.1 shows a bubble diagram which compares the significant correlations for each of the firms.

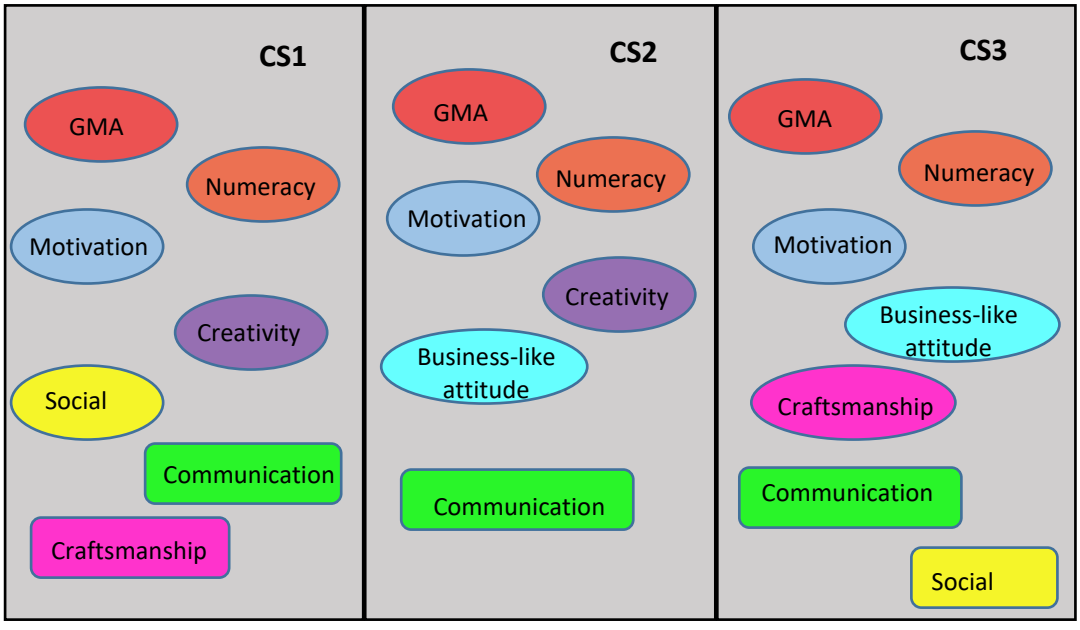

Figure 6.1 Bubble diagram of differences between CS1, CS2 and CS3 in the significant correlations between individual attributes and overall performance

Apart from GMA, motivation and numeracy that are constant in all three case study firms, the varied mix of individual attributes significantly correlated with overall performance suggest that the firm context and environment has some influence on the development of individuals and on their performance. To investigate the potential impact of the individual attributes making up an organisation's workforce on its learning and development practices, the researcher ran a one-way Analysis of Variance (ANOVA) using SPSS to determine the significant differences between the case study firms. The resulting ANOVA table and mean plots are presented in Annex 3.5 of the appendices.

The results indicate that motivation may be homogeneous across the firms. Significant differences across all firms were found in the general mental abilities of each firm's workforce and overall performance. Between CS1 and CS2, significant differences were found in worker's social skills, business-like attitude, creativity, craftsmanship, numeracy skills, GMA and overall performance. Comparing CS1 and CS3, significant differences were found in workers' communication skills, numeracy skills, motivation to know, GMA and overall performance. Between CS2 and CS3 the significant differences were in intrinsic motivation to know, GMA and overall performance. See Annex 3.5.

These results suggest that the contextual variables and learning environment of each organisation influence the manner in which its workforce learns and performs. This further supports the notion that customised learning solutions for construction organisations based on empirically determined needs would be more efficient than generic training programmes. It also highlights the need for developing individual learning plans for workers in construction organisations that take into consideration previous learning and contextual requirements for learning and performance.

6.5.1.2 Intrinsic Motivation to Know

The intrinsic motivation to learn resonates strongly with overall performance in all three case study firms: CS1 ($r = 0.332$, $p \leq 0.001$); CS2 ($r = 0.544$, $p \leq 0.001$); and CS3 ($r = 0.763$, $p \leq 0.001$). These represent the highest correlations amongst all types of motivation measured for each firm. This form of motivation drives learning, continuous improvement and innovation. Keeping intrinsic motivation to learn high among workers is therefore critical for improving and optimising workforce performance.

Some types of extrinsic motivation also correlated highly with overall performance. Extrinsic motivation is tied to either rewards or fear of punishment. Although they are considered of less value than intrinsic motivation forms, their impact on performance can be used positively by organisations in performance improvement programmes. For instance, extrinsic motivation identified involves an individual worker investing time and effort on activities that are important to them, activities that will help them attain what they desire, their personal objectives and activities that will give them self-worth. Where the individual worker's desires, personal objectives, aspirations and sense of self-worth coincide with an organisation's strategic direction and objectives, potentials for performance optimisation are increased both for the individual and for the organisation. Alignment of workers' personal learning and development plans and career progression aspirations with organisation's business objectives is therefore critical. These can be achieved through agreement within some form of social contract between the organisation and the individual worker.

The willingness to learn and to become involved in learning requires individual commitment without which, learning will not take place no matter the strategies put in

place by management (Carrim and Basson, 2013). Nafukho (2013) highlights the importance of individual choice in learning and development holding that planned development is most likely to fail where individual choice is lacking. Ahmad, *et al.* (2015) found that capacity building of employees enhances their performance only when the career development of the employee is also enhanced.

6.5.2 Workforce Learning and Development Practices

The interviews conducted within the case studies highlighted each organisations disposition towards the key issues in WLD. Table 6.9 summarises each organisations perceptions and practices in relation to each of the WLD practices in focus. Table 6.10 summarises each organisation's perceptions and dispositions in relation to the WLD categories. The two tables use the following keys to represent the dispositions:

KEY

- Accepted and practiced consistently √√√
- Accepted in principle, practiced, but not formally or consistently √√
- Widespread acceptance in principle but not practiced √
- Not accepted widely and not practiced -

Table 6.9 Construction firms' dispositions to WLD practices

WLD Practices	CS1	CS2	CS3
Develop a strategic workforce plan for organisation's workforce	√	√	√
Executive commitment to developing capability of workforce	√√	√√	√√
Define and develop workforce in work competencies, the competencies strategic to business	√	√	√
Ensure the diffusion of technology across levels, projects and functions	√√	√	√
Create separate career track for trainers, and coaches (coaching vs managerial progression)	√	√	√
Acquiring the right talent	√	√√	√
Standardise compensation and reward systems and deploy as incentives for desired performance	√	√	√
Establish HR strategies and practice, staffing and compensation	√√	√√	√√
Ensuring employment equity	√	√	√
Establish line management responsibility for learning and development of subordinates	√	√	√

Table 6.9 Construction firms disposition to WLD practices (cont'd)

WLD Practices	CS1	CS2	CS3
Provide learning spaces close to the work, exploit IT capability	√	√	√
Communicating business vision and goals to all levels and across projects and functions	√	√√√	√√√
Promoting cross divisional dialogue, continual discussions on how to improve performance	√	√	√
Promote cross organisational communication, vertical and horizontal	√	√	√√
Making information accessible to all, across levels, projects and functions	-	√	√√
Increase line of sight and visibility across the whole organisation, open communication in real time	√	√	√
Develop a culture of every day learning and continuous improvement	√	√	√√
Create a learning environment, social and physical structures as well as resources	√	√	√√
Develop organisation's knowledge management system	√√	√	√√

Table 6.9 Construction firms disposition to WLD practices (cont'd)

WLD Practices	CS1	CS2	CS3
Custom design learning to specifically address identified workforce need	√	√	√
Provide employees with sufficient resources to pursue goals	√	√	√
Exploit technology for learning provision and knowledge generation, capture and diffusion	√	√	√
Manage labour learning and development costs	√	√	√
Train internal trainers, mentors and coaches	√	√	√
Provide employees with sufficient training to pursue goals	√	√	√
Integrate learning across projects, functions and business units	√	√	√
Provide overall training consistency	√	√	√
Promote employee engagement with the organisation, develop a sense of ownership in workers	-	√√	√√
Encouraging employee participation in the organisation at all levels	√	√	√√

Table 6.9 Construction firms disposition to WLD practices (cont'd)

WLD Practices	CS1	CS2	CS3
Involve all workers in decision making so organisation gets full benefit of workforce competence	-	√	√√
Provide employees with sufficient authority to pursue goals	-	√	√
Provide informal learning opportunities on project sites	√√	√√	√√
Provide informal learning opportunities	√√	√√	√√
Generate real time metrics on labour data and using this to make projections and set targets	√√	√√	√√
Establish baselines from which performance improvement efforts are progressed	√	√	√
Use job-pairing of less experienced with more experienced to increase capacity	√√	√√	√√
Exploit job rotation to increase potential for multi-skilling	√	√	√
Allow worker participation in special projects to build capacity	√√	√√	√√
Individuals take personal responsibility for their own learning and development	√√	√√	√√

Table 6.9 Construction firms disposition to WLD practices (cont'd)

WLD Practices	CS1	CS2	CS3
Reward and recognise participants' success in learning and development (formal or informal)	√√	√√	√√
Develop workgroups/teams to balance skill sets and increase capacity	√√	√√	√
Formalise employee mentoring and coaching	√	√	√
Develop a culture of innovation	√	√	√
Provide learning options and resources appropriate for construction sites	√	√	√
Manage innovation	√	√	√
Develop a culture of no blame for genuine mistakes, rather to focus on solving problems	√	√	√
Re-employing retired highly skilled and experienced people in training, mentoring and coaching roles	√	√	√
Manage career development programs for all staff at all levels	√	√	√
Align individual career progression with business objectives	√	√	√

Table 6.9 Construction firms disposition to WLD practices (cont'd)

WLD Practices	CS1	CS2	CS3
Manage individual learning, plan and organise learning towards agreed growth targets	√	√	√
Develop individual attributes for effective learning, employees learn how to learn	√	√	√
Increase self-esteem of workers, give them an identity, a sense of belonging and purpose	√	√	√
Reward and motivate individuals	√√	√√	√√
Automate labour data collection and analysis	√	√	√
Embed performance management as a people management function	√	√	√
Providing 360-degree feedback to workers to encourage improvement	√	√	√
Alignment of learning, development and performance with business objectives	√	√	√
Provide feedback on employee contributions to achieving business goals	√	√	√
Provide recognition for contribution to business goals	√	√	√

Table 6.10 Construction firm's dispositions to WLD categories

WLD Categories	**CS1**	**CS2**	**CS3**
Strategic workforce planning	√√	√	√
Workforce practices	√	√√	√
Communication and coordination	√	√	√√
Performance management	√	√	√
Alignment	√	√	√
Learning culture	√	√	√√
Learning resources	√	√	√
Integration	√	√	√
Employee involvement	√	√	√√
Learning spaces	√	√	√
Project workforce capability development	√√	√√	√√
Developing workgroups and teams	√√	√√	√
Managing project WLD	√	√	√
Career development	√	√	√
Managing individual learning	√√	√√	√√
Whole person approach	√	√	√

6.5.3 Maturity Model Definition

The findings from the case studies were integrated to enable the development of a learning and development optimising solution for construction organisations (de Bruin *et al.*, 2005). The research set out to resolve three interrelated dimensions of the organisations: ability or inability to improve individual workers' learning effectiveness and to optimise individual performance; ability or inability to improve the construction

firms' workplace learning effectiveness and efficiency; and ability or inability to channel workplace learning and performance towards achieving business objectives.

The individual worker's effectiveness can be improved on by focusing on developing and strengthening in the individual, the relevant attributes in the individual that need to interact to optimise learning and performance. An effective and efficient learning environment of the construction organisation can be improved upon by integrating the relevant WLD practices that enable learning, development and performance optimisation. The learning, development and performance of individual workers can be channelled towards achieving business objectives by performance management and continually aligning learning and performance to business goals.

To resolve these, fifty-nine WLD key practices covering all three dimensions were validate within the case study construction organisations as comprehensive and applicable to WLD. The practices were categorised into 16 components to provide a manageable way of describing the complex domain of WLD practice. In recognition of the fundamental role of alignment and performance management, these two components were each divided into three components to allow for performance management at organisational level, performance management at project level, performance management at individual level, alignment at organisational level, alignment at project level and alignment at individual level (Harrison, 2009). This was considered important because as asserted by some of the interviewees, construction firms were not 'schools' but existed to achieve business objectives. Ensuring that learning at every level was channelled towards optimal performance for the purpose of achieving business goals.

The resulting 20 components were abstracted further to discern logical links and connections between and across categories leading to the creation of the following four tentative dimensions: shaping the workforce; building a learning environment; managing the project WLD; and individual worker learning and development (Chenail, 2012). Figure 6.2 shows the hierarchical structure of the dimensions and components.

These dimensions and components formed the tentative structure for the conceptual construction learning and development model. This tentative solution further went through a populating and refining process to arrive at the final model which was tested and validated using three other construction firms not involved in the model development process. The model population and refining process was iterative involving three focus groups from the case study construction firm.

6.6 Summary

According to Poortman *et al.* (2011), educational and training efforts traditionally focus on the cognitive aspect of learning, the content. Some non-traditional learning approaches consider the social dimensions of learning in deciding on the interactions that will be used in delivery of learning. The motivations, emotions, defences and resistance of the learner are rarely taken seriously. The results of the psychometric assessments reported in this chapter support the consideration of the emotions, motivations and drives of intermediate skilled workers as they learn in the construction workplace. Consequently, to optimise learning and performance, there is a need for a social contract between the organisation and the individual worker. The social contract would ensure that the organisation encourages and supports the holistic development of the worker, optimising their performance along an agreed path.

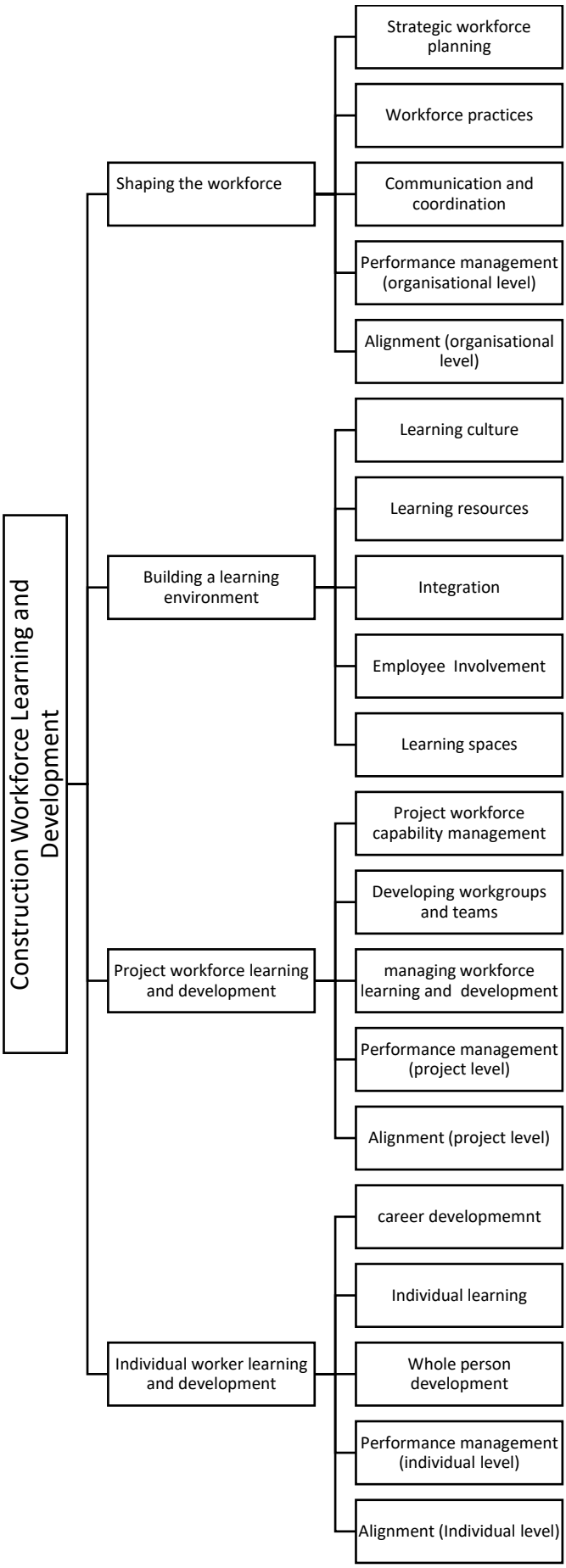

Figure 6.2 Dimensions and components of a construction WLD solution

The agreed path should align with the aspirations of the worker for career progression and at the same time align with organisational objectives. A holistic approach to individual worker development is therefore a consideration in the development of the WLD optimising model described in the next chapter.

Furthermore, the case study interviews have validated the WLD key practices that were first synthesised from literature and then contextualised for the construction industry through a questionnaire survey during the preliminary exploratory phase of this research. The sixteen (16) components that emerged after the case study interviews formed the basis for the tentative learning model developed within this research.
The decision to add a layer of detail above the layer of components emerged from some reflection on the validated components for the model.

The distinctions that had been made between practices at organisation, project and individual levels suggested that WLD at each of those levels should be treated as separate dimensions. Also, the all-encompassing and critical element of building a learning environment seemed to demand a separate dimension within the domain. The 20 components were therefore categorised under four distinct but interrelated dimensions and the following labels were given to define the complex domain to an even higher level of detail:

- Shaping the Workforce
- Building a learning Environment
- Managing project WLD
- Individual Worker Learning and Development

The next chapter describes the model development phase of the research.

CHAPTER 7 MODEL DEVELOPMENT

7.1 Introduction

The ultimate aim of WLD in an organisation is to optimise workforce performance. This is what the Construction Learning and Development Optimisation Model (CLEARDO) is designed to enable construction organisations to do. The method for developing the customised maturity model for WLD within construction firms is the subject of Chapter 7 of this thesis.

7.2 Stage 1: Defining the Model Scope

The scope was first established in order to set the boundaries for model application and use (de Bruin *et al.*, 2005). The scope also provided basic information about the application domain, set pre-requisites and limitations of the application, its purpose of use, and most importantly the focus and target group (Roglinger *et al.,* 2012).

7.2.1 Domain Area and Dimensions

The purpose of the proposed model is to provide a structured approach to the continuous improvement of the capability for learning and consequently the performance of a construction organisation's workforce. In order to achieve the ideal, it was necessary to cover all aspects of workforce learning, development and performance management within the construction organisation from strategic planning to tactical implementation at organisation, project and individual levels. The extensive review of literature conducted provided a deep understanding of the historical and contemporary issues of learning and performance in the workplace and the construction business context. The literature review is reported in Chapter 2 and Chapter 3 of this thesis. The

subsequent preliminary exploratory surveys (Chapter 5) and the case studies findings (Chapter 6) refined and provided evidentiary support for the workplace learning and development groupings of key practices outlined in the four tables in Annex 4.3 showing component descriptors, supporting references, exploratory survey ratings and case study interviews. The consensus from previous studies and the perceptions of Nigerian construction industry experts as well as the management and staff of the case study construction firms support the notion that the listed key components would potentially work together to build a strong workforce within a construction organisation. These validated groups of key practices formed the components of the maturity model (Curtis, et al., 2009). The subsequent abstraction categorised the 20 components under four distinct but interrelated dimensions with the following labels:

- Shaping the Workforce
- Building a learning Environment
- Managing project WLD
- Individual Worker Learning and Development

(See Section 6.5.3)

The 20-component structure within the four dimensions appropriately define the complex domain of WLD to an even higher level of detail. The focus groups from the three case study construction firms validated the four-dimensional framework with twenty components, populated the model with sub-components and validated the maturity assessment questions. Figure 7.1 shows the relationship between the four dimensions within the WLD domain of a typical construction organisation. Figure 7.2 presents the domain dimensions associated with each of the two units of analysis of the research, individual workers (learners) and construction organisation (learning context).

The figure also represents strategic and tactical dimensions in WLD at organisational level and at project level.

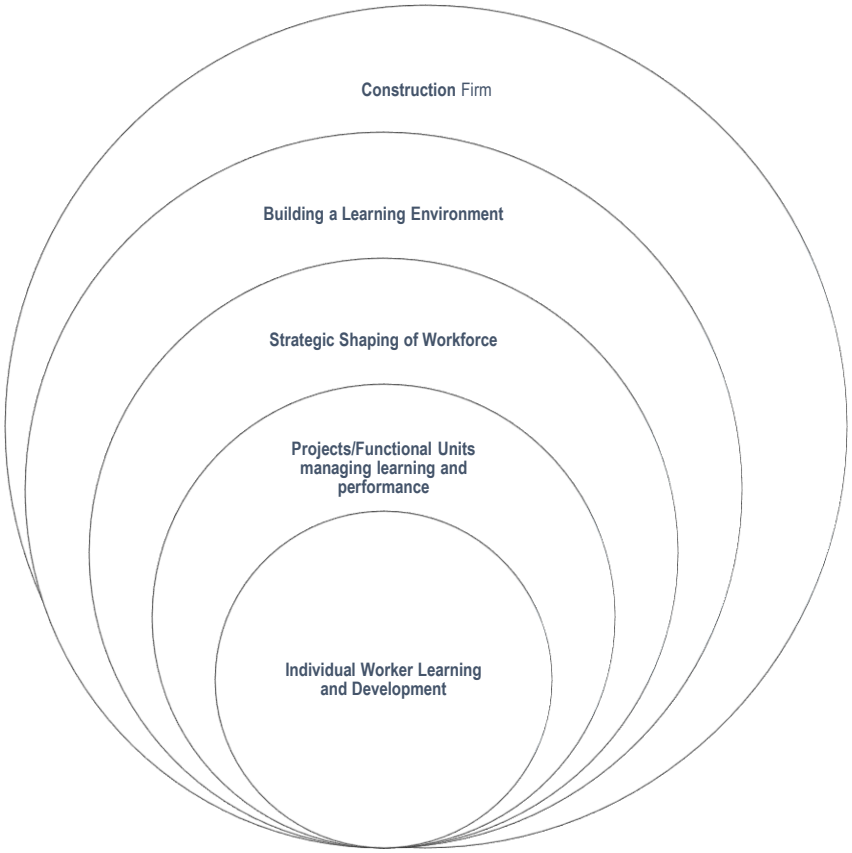

Figure 7.1 WLD dimensions within the construction organisation

7.2.1.1 Shaping the workforce

This dimension is concerned with construction organisations thinking strategically about workforce issues rather than reactively. It involves construction organisations moving from ad hoc and reactive people management strategies to establishing mechanisms for not only developing existing workforce skills but also developing the capability for growing new types of roles. This will enable organisations to adapt to the changing nature of work driven by new knowledge, sophistication in technologies and shifting contexts. Managing talent and innovation has become more demanding in an era of

shortage of skilled labour compelling construction organisations to respond innovatively.

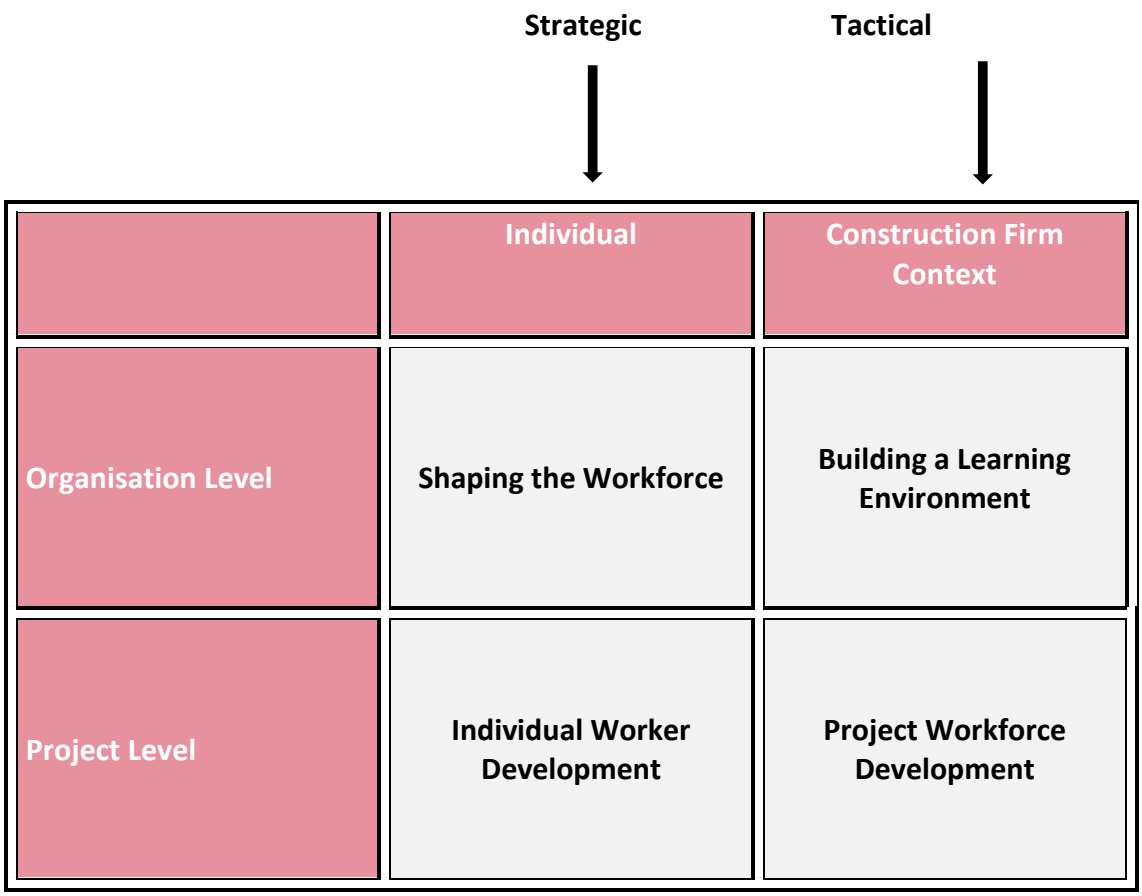

Figure 7.2 Dimensions of construction WLD

7.2.1.2 Building a learning environment

This domain area is concerned with the setting in which the workforce develops. This research takes the view that skills are features of the workplace as a complex social system rather than just features of individuals or jobs (Stasz *et al.*, 1996). Learning and performance on the job are integrated within a workplace context. Developing and sustaining a learning and performance driven environment is therefore critical for workplace development and performance.

7.2.1.3 Managing the project workforce

This domain area is concerned with integrating learning at project level into workforce development in construction organisations. This is important because although project workforce is traditionally treated as volatile and transient, it is at these levels that the productivity of a construction organisation is tested. Furthermore, every other activity of the organisation exists to support the successful completion of the project and the highest proportion of the workforce is engaged in work at the project level. Although construction project durations are finite, they often last for a number of years and the potentials for improving existing skills and learning and developing new skills the period are immense. The challenge for the organisation in this dimension is to harness the learning and innovation potential of construction projects and channelling these into improving the performance of the organisation's objectives.

7.2.1.4 Individual worker development

This domain area is concerned with developing the individual worker in order to optimise performance. This is important because individual performance aggregates into organisation performance. The willingness to learn and to become involved in learning requires individual commitment without which, learning will not take place no matter the strategies put in place by management (Carrim and Basson, 2013). This research takes the view that properly implemented a win-win result is achieved with a purposeful, driven and satisfied workforce continuously learning and improving towards achieving the organisation's business goals with the promise of innovation.

7.2.2 Purpose of Use

The learning and development optimisation model has been designed for descriptive and prescriptive purposes and has the potential for comparative uses. It is descriptive in the sense that it provides a diagnostic tool that enables assessment of an organisation's current position in relation to each of the domain areas of WLD (de Bruin *et al.,* 2005) (Roglinger *et al.,* 2012). The model also assists in the determination of a desired position and enables the development of a plan to improve the position of the organisation from the current position to the desired position, therefore allowing for a level of prescription use (Roglinger et al., 2012). Furthermore, the model emphasises the relationship between workforce learning and development efforts to performance and consequently indicates an approach to maturity improvement (de Bruin et al., 2005). Although the model does not incorporate a decision calculus for evaluating different alternative prescribed practices (Roglinger *et al.,* 2012), it does provide requirements for decisions to be made and outcomes evaluated enabling organisations to focus on the factors that actually influence evolution and change rather than on a predefined "end state" (King and Kraemer, 1984). The model was developed within three construction firms that were selected to provide theoretical replication and consequently analytical generalisability (Yin, 2014). The model therefore has potential for applicability for comparative benchmarking.

7.2.3 Development Stakeholders

The domain, dimensions and purpose of use of the model defined those to provide input in its development. The model was developed within three construction firms in Nigeria; one large, one medium and one small construction firm. The large firm (CS1) has capability to handle multiple building and civil engineering construction projects and has

carried out projects across all six geographical areas in Nigeria. Input was obtained from management and staff across various functions (construction, plant and equipment, design, administration, HR, commercial management, health and safety) and supporting business units (quarry, precast concrete and asphalt plants) to insure broad acceptability of the model. The medium firm (CS2) has capability to handle building and civil engineering construction projects and has carried out projects across three out of six geographical locations in Nigeria while the small firm has capability to handle building projects and has handled projects across three geographical zones in Nigeria. Although functions overlap, in the medium and the small firms, input was also obtained across all functions and supporting business units.

7.3 Stage 2: Design

This phase of the model development sought to determine a design or architecture for the model that provides the basis for further development and application (de Bruin *et al.*, 2005).

7.3.1 Design Principles

7.3.1.1 Audience

In order for the design of the model to reflect the needs of the intended audience, a balance had to be struck between the complex reality of the construction workplace and model simplicity. An unduly simple model would not adequately represent the complexity of the domain and therefore would not provide useful information for WLD. On the other hand, too much detail may create confusion and consequently incorrect application of the model. An approach to dealing with complex domains is a 'stage-gate' approach achieved by providing additional layers of granularity which enables the

determination of separate maturity profiles for discrete areas within the domain as well as an overall assessment (de Bruin *et al.,* 2005). The CLEARDO therefore employs a hierarchical structure with multiple layers. The layers are represented by the domain, dimensions, dimension components and dimension sub-components. Maturity assessments can be obtained for each discrete area as well as aggregated assessments. Reports can then be tailored to the needs of a variety of audiences. For instance, Figure 7.3 shows a graphic representation of layers mapped to potential audiences in a construction organisation.

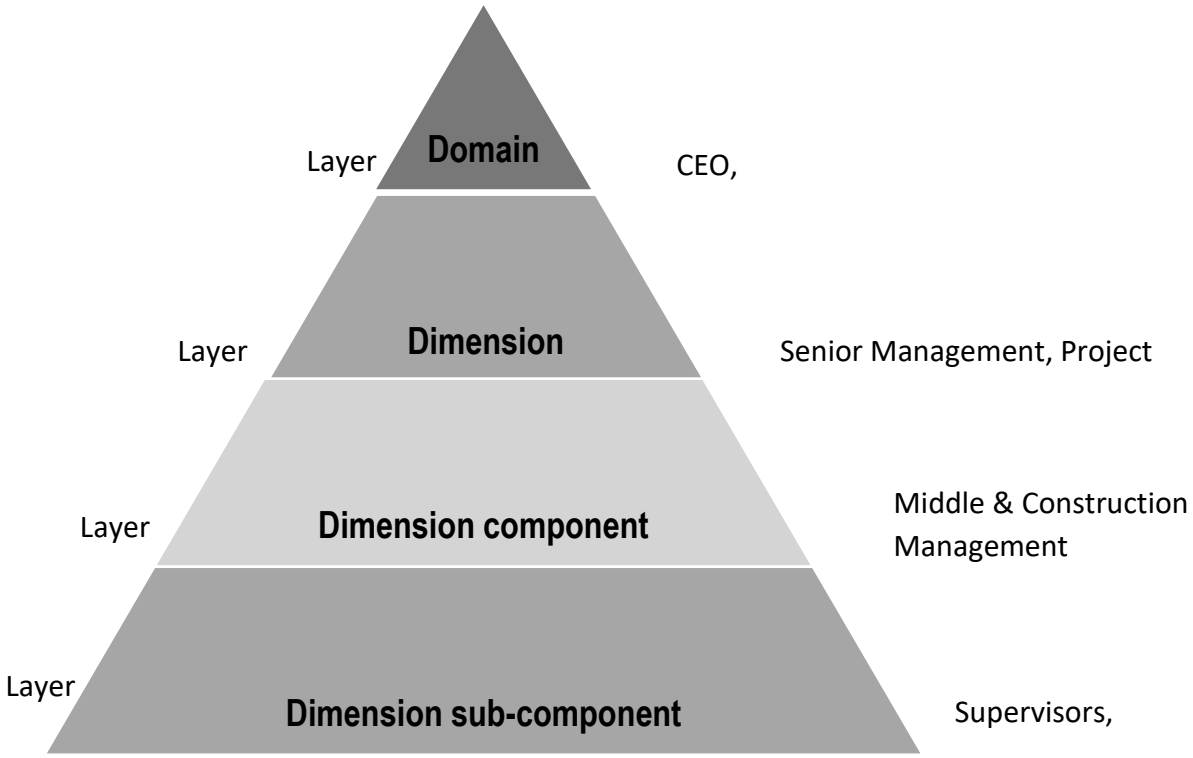

Figure 7.3 Construction Learning and Development Optimisation Maturity Model layers

7.3.1.2 Method of application

The CLEARDO assessment tool was designed for self-assessment. Scale response options to each question were randomised to improve objectivity and reduce bias in assessments. For instance, Table 7.1 shows a maturity assessment question with the responses arranged in ascending order of maturity while Table 7.2 shows the same

question with the responses randomised. Alternatively, assessment can be assisted by an objective third party.

Table 7.1 Sample assessment question with responses arranged in ascending order of maturity

Is there a mentoring and coaching program in place for learning and development on project sites?	Initial Level 1	Managed Level 2	Defined Level 3	Measured Level 4	Optimising Level 5

Table 7.2 Sample assessment question with responses randomised

Is there a mentoring and coaching program in place for learning and development on project sites?	Mentoring and coaching are understood in principle but no programme is in place	Performance of mentoring and coaching programmes is regularly measured and evaluated and provide basis for improvement plans	Mentoring and coaching processes are continuously improved based on quantitative assessments of its performance	Processes for mentoring and coaching are properly defined, documented and institutionalised; objectives and targets are set	Specific persons are responsible for managing and implementing the mentoring and coaching programme with roles properly defined

7.3.1.3 Application Drivers

The expectation is that application of the CLEARDO will be driven by internal organisational needs to optimise workforce performance by continuously improving processes for holistic and integrated learning initiatives aimed at building up human capital. Duffy (2015), leaning on human capital theory and the resource based view of firms, argues that the processes, knowledge, technical expertise and other strategic resources vital to the survival of firms, in the prevalent knowledge economy, are the

products of its human capital. This is pertinently evidenced by the willingness and enthusiasm of the three case study construction firms (CS1, CS2 and CS3) who have participated in this research. All three firms have expressed a desire to apply the fully developed model to WLD in their organisations.

An external application driver would be the need to meet the requirements for ISO 9001 certification. Both CS1 and CS2 are of the opinion that application of the model will boost their efforts in meeting the requirements for ISO 9001 certification in the areas of: involvement of people; process approach; system approach; continuous improvement and a factual approach to decision making in the organisations' management of their workforces.

7.3.1.4 Application

The model was developed within one large, one medium and one small construction firm in Nigeria to provide theoretical replication. The expectation is that the CLEARDO will have general applicability to construction firms operating in Nigeria since they draw from the same pool of construction workers. Though the model development was context specific, the underpinning theories and principles have universal application and therefore it is expected that the model will find applicability in other regions with some adaptation for context.

7.3.2 Maturity Levels

7.3.2.1 The concept of maturity

The Cambridge English Dictionary (2016) defines maturity as a very advanced or developed form or stage. It is generally learned rather than instinctive and does not

necessarily relate to age (Wechsler, 1950). Maturity involves a series of transformation processes over time which implies an ongoing process, a dynamic operation which has no end point or fixed norms but is continuously and progressively at work (Frank, 1950). For an individual, maturation through varied stages involves assimilation of new information into schema and adjusting schema to accommodate same and thereby encouraging developmental growth (Johnson and Lambie, 2013). Applied to organisations, maturity is developmental, an ongoing process of transformation recognised by the level of formality, sophistication and embeddedness of processes or practices. Maturity in a process is said to increase from non-existent or ad hoc to optimising (Bititci, *et al*., 2015). Levels of maturity are typically recognised when an organisation exhibits a benchmark set of evolutionary attributes, characteristics, patterns or practices and these form the basis for assessment (Knight *et al*., 2013). These benchmarks typically represent best practices (Knight *et al*., 2013), success factors (Babatunde *et al.*, 2016; de Bruin *et al.*, 2005; Roglinger *et al*., 2012) and standards (Knight *et al.,* 2013).

7.3.2.2 The Concept of Maturity Levels

A maturity level is a well-defined evolutionary plateau for organisational process improvement (SEI, 2010). Pertinent to this research, each maturity level defines a level of capability for improving the organisation's workforce (Curtis *et al.,* 2009). They also lay successive foundations for continuously improving talent and developing an effective workforce. SEI's P-CMM like most other CMM derivatives consists of five maturity levels: initial; managed; defined; measured; and optimising (Curtis *et al*., 2009).

7.3.3 PCMM Behavioural Characteristics of Maturity Levels

7.3.3.1 Maturity Level 1: The Initial Level

The initial level sometimes named the 'ad hoc' level is characterised by inconsistency in performing workforce practices. The practices tend to be ritualistic, a typical instance being where the organisation provides forms for performance appraisal or for staff requisitioning but little guidance or training for conducting the activities supported by the forms. Managers are left to their own devices; there is rarely a shared common vision about the responsibility of managers. Most perceive management to be about producing results and not about producing people who can produce results. Although people own responsibility for developing their knowledge, skills and abilities, managers have the additional responsibility for ensuring that the people in their units have the knowledge, skills and abilities to perform their work and the responsibility for providing the opportunities to develop them. The first step in developing a capacitated workforce is to get managers to take responsibility for the capability and development of those who report to them. For the construction workforce, the implication is that from the project manager who is responsible for one or more projects right down to the headman responsible for a few skilled and unskilled workers, each is responsible for the learning and development as well as performance of those who work under them (Castledine and Renwick, 2012; Curtis *et al.*, 2009; Eraut, 2004).

7.3.3.2 Maturity Level 2: The Managed Level

Focus at this level is on establishing basic practices in units that address the immediate problems of WLD and to prepare managers for more sophisticated practices at higher levels. This level also establishes a foundation in performance management. Executive management at this level is expected to commit the organisation to continuous

improvement of knowledge, skills, motivation and performance of its workforce through providing policies and resources to support and manage performance of all its mangers in this regard. Regular performance leads to consistency and processes that are repeatable creating a stable environment for work. Level 2 is characterised by capability of units to meet commitments, regular discussions to identify ways of improving knowledge, skills, process abilities and performance; and performance management.

7.3.3.3 Maturity Level 3: The Defined Level

Although basic workforce practices are consistently performed, there is inconsistency across units and little synergy across the organisation. Common knowledge, skills and process abilities need to be identified and standardised. At this level, there is a need to develop an organisation wide infrastructure that builds on identified best practices that tie the capability of the workforce to strategic business objectives. This establishes the architecture of the workforce which evolves as business conditions and technologies change. To meet strategic objectives, strategic plans are required to ensure that capability in each of its current or anticipated work competencies. All other workforce practices are adapted to motivate and support development of workforce competencies since the competency based processes form the basis for defining workgroup roles and optimising processes. As competent individuals are developed, they demand more autonomy in performing work; the organisation at this level needs to create an environment that allows for participation in operational decisions about business activities. A participatory culture enables the organisation to gain maximum benefit from the capability of its workforce competencies while establishing the environment necessary for empowering workgroups. The entire organisation's workforce now begins to share responsibility for developing increasing levels of capability in the organisation's

workforce competencies. At the same time the workforce practices implemented at Level 2 are adapted to encourage and reward growth in workforce competencies.

7.3.3.4 Maturity Level 4: The Predictable Level

An organisation mature at Level 3 has established an organisational framework for developing its workforce. The organisation now needs to develop the ability to manage its capabilities and performance quantitatively. It can predict its capability for performing work because it can measure the capability of its workforce and the competency based processes they use to perform the work. The process starts when competent people perform work, the organisation preserves the results of performing work, and develops them as organisation assets to be reused by others. Effective creation and use of assets leads to the spread of learning rapidly through the organisation. Productivity rises as reuse replaces redevelopment and as trust and confidence in workforce improves, responsibility and authority is transferred to work groups. Consequently, with delegation, managers can now be even more strategic. Furthermore, different competency-based processes are integrated into single multi-disciplinary processes. Performance is measured within each workgroup or unit and performance baselines are established and used for planning, target improvement, prediction of organisation capacity for work, corrective action and strategic decisions.

7.3.3.5 Maturity Level 5: The Optimising Level

At this level, the entire organisation is focused on continual improvement. Improvement efforts are directed at capability of workgroups, performance of competency-based processes and workforce practices and activities. Quantitative management activities at Level 4 are used to guide improvements at Level 5. Change management is treated as

an ordinary business process. Performance is aligned at all levels and through all levels to the organisations objectives and impact of improvement activities on performance is continuously evaluated and corrective action taken where necessary.

7.3.4 CLEARDO Maturity Levels Defined

The PCMM which is configured along the lines of the CMM and the Capability Maturity Model Integrated (CMMI) comprises five levels of maturity. The five levels profile the maturity of an organisation from an Initial/Ad hoc Level 1 to an Optimising Level 5. Some maturity models start from a Level 0, characterised by active discouragement of the capability being assessed and evolve to a sixth level of maturity characterised by continuous improvement (de Bruin *et al.,* 2005). Other models start from an initial level 1 and progress to a Managed Level 3 adopting a three levels or stages of maturity.

The CLEARDO broadly adopted the five maturity levels of the PCMM because it provides a framework which allows organisations to determine their maturity profile at any given time and enables the organisation to develop improvement plans that focus on critical areas. The PCMM is a derivative of the CMM adapted for use in the WLD domain area. In addition, the CMM maturity framework has wide recognition and use in various industries including construction (Babatunde, *et al*., 2016). The PCMM has been used in various industries including construction as well and has been the subject of extensive testing and validation (Curtis *et al*., 2009). De Bruin *et al.*, (2005) notes that, though the number of maturity stages may differ from model to model, it is important that final stages are distinct and well defined and that there is logical progression through the stages. From these perspectives, the maturity levels for the CLEARDO were defined and validated during the focus group iterations.

A top down approach was used as definitions of the maturity levels were written first and then the assessment measures were developed to fit the definitions. Results are presented in the next chapter. Figure 7.4 presents the CLEARDO maturity levels showing the evolutionary stages of WLD in a construction organisation. More detailed descriptors of each maturity level can be found in Chapter 8, Section 8.5.

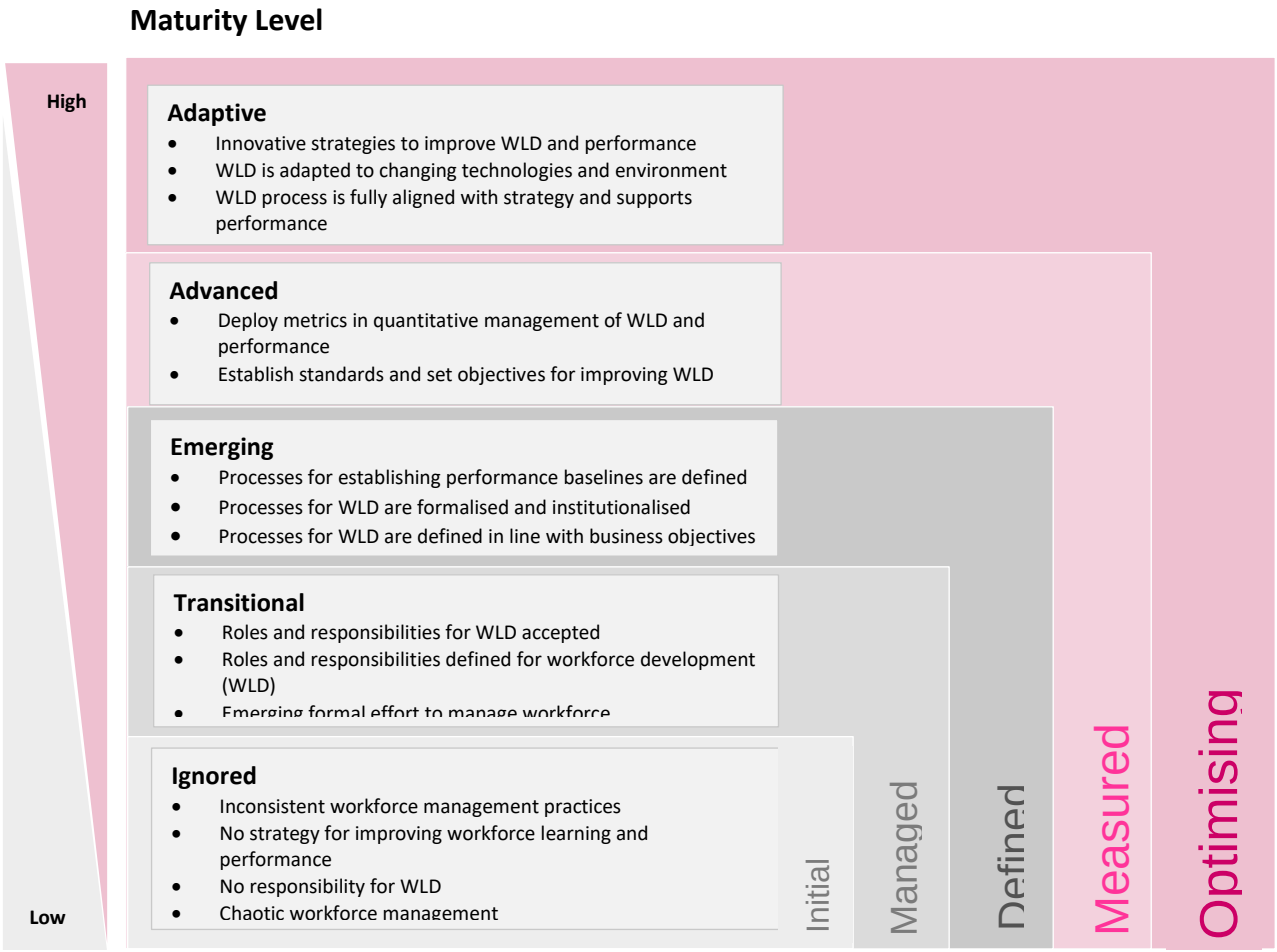

Figure 7.4 CLEARDO maturity levels

7.4 Stage 3 Model Population

This phase of the model development required the identification of components and sub-components critical to WLD and the means for assessing maturity of the organisation in each of the identified areas. Identification of these components and sub-components provided a deeper understanding of the complex construction workforce

domain and further enabled the identification of improvement strategies (de Bruin *et al*., 2005). A specific objective of the model population process was to identify components and sub-components that are mutually exclusive and collectively exhaustive (de Bruin *et al*., 2005). It is pertinent to mention that the model development process was iterative and with each iteration, the model was further refined until a consensus position was reached. The following section is a review of the process up to the stage of model population and refinement.

7.4.1 Foundations of CLEARDO

The extensive literature review carried out in Phase 1 of the research was the first step in identifying the domain components for CLEARDO. The availability of a rich stream of literature related to WLD was expected to ensure that the components and sub-components identified were exhaustive. Appendix I is a comprehensive list of key practices in WLD derived from literature with appropriate references and underpinning theories. References have been updated to ensure currency. The key elements of WLD identified from literature formed the basis for developing the questionnaire administered to construction organisations in the Preliminary Exploratory Study (Chapter 5) of the research. From the analysis of returned questionnaires, 59 out of the initial 66 practices in the questionnaire were significant for successful WLD. These 59 key practices were categorised into 16 components and formed the framework for analysing the case study interviews.

The emerging 16 components were validated by participants during the case study phase of the research. Responses indicated that performance management and alignment practices were important at organisational level, project level and individual

levels. This resulted in an increase in the number of components from 16 to 20. The 20 components are detailed in Annex 4.3 in Appendix IV of this thesis. To determine the most appropriate modelling framework to apply, two management staff from each of the case study firms were presented with fact sheets (See Annex 4.1) for four modelling techniques: Balanced Score Card; Quality Function Deployment; CM); Capability Maturity Model; and the Generic Design and Construction Process Protocol. In order to select a tool that the organisations would be comfortable using, they were each asked to rate the four options for: flexibility; easy to understand; easy to use; potential for identifying a path for continuous improvement in WLD; and alignment with business strategy. Details of the result of this mini-survey are presented in Annex 4.2 of the Appendix to this thesis. The results provided a compelling argument for the use of the capability maturity modelling tool for the WLD model.

7.4.2 Focus Groups

Focus groups were set up to populate and refine the model. Each of the case study firms selected thee middle level managers and two supervisors to participate in the focus groups. Table 7.3 shows the distribution of members of the focus groups. The process was designed to involve three iterations. The first iteration involved members from each firm holding discussions on their own to populate the model. The three groups collapsed into two groups for the second iteration. All the groups met together in the third and final iteration to arrive at a consensus on the sub-components to populate the model. The resulting framework of components and subcomponents are presented in the following tables. Table 7.4 shows the components and sub-components for the “Shaping the Workforce” dimension of the model. Table 7.5 shows the components and sub-components for “Building a Learning Environment” dimension. Table 7.6 shows the

components and sub-components of the “Managing the Project Workforce Learning and Development” dimension. Table 7.7 shows the components and subcomponents for the “Individual Worker Learning and Development” dimension of workforce learning and development.

Table 7.3 Distribution of focus group members

ID No.	Organisation of focus group member	Responsibility	Years of Construction Experience
CS1- FGM1	Case Study 1	Management	30
CS1- FGM2	Case Study 1	Construction manager	30
CS1- FGM3	Case Study 1	Construction manager	18
CS1- FGM4	Case Study 1	Supervisor	17
CS1- FGM5	Case Study 1	Supervisor	17
CS2- FGM1	Case Study 2	Management	21
CS2- FGM2	Case Study 2	Construction Manager	30
CS2- FGM3	Case Study 2	Construction Manager	18
CS2- FGM4	Case Study 2	Supervisor	13
CS2- FGM5	Case Study 2	Supervisor	13
CS3- FGM1	Case Study 3	Management	30
CS3- FGM2	Case Study 3	Construction Manager	9
CS3- FGM3	Case Study 3	Construction Manager	7
CS3- FGM4	Case Study 3	Supervisor	18
CS3- FGM5	Case Study 3	Supervisor	7

Table 7.4 Components and sub-components for shaping the workforce

SHAPING THE ORGANISATION WORKFORCE				
Strategic Workforce Planning	**Human Resource Management**	**Communication and Coordination**	**Performance Management**	**Performance Alignment**
Determine workforce competencies strategic to business	Develop a repository of knowledge skills and process abilities for each workforce competency	Develop interpersonal communication and coordination skills of workers	Performance planning	Continually align workforce architecture to business objectives
Define competency-based processes	Develop and effective recruitment strategy	Establish communication mechanisms	Performance evaluation and reviews	Align performance at all levels and across projects to business objectives
Determine baselines for processes	Establish appropriate workforce practices for staffing	Coordinate commitments	Process performance baselines and quantitative performance models	Standardise workforce practices across business units
Outline workforce architecture	Integrate competency-based processes	Coordinate continuous improvement of workforce practices	Manage the performance of competency-based processes	Adjust workforce practices to business needs
Managers responsible and accountable for learning and development	Develop talent and innovation management practices	Conflict and dispute resolution	Manage outstanding performance	Develop synergy across units

Table 7.5 Components and sub-components for building a learning environment

BUILDING A LEARNING ENVIRONMENT				
Learning Culture	**Learning Resources**	**Integration**	**Employee Involvement**	**Learning spaces**
Develop a culture of continuous improvement	Individuals and workgroups capture and store knowledge developed from performing competency-based processes	Integrate workforce practices across units	Participatory decision making	Manage work environment to support learning
Workplace learning options (practice, sharing, promoting good practice, modelling)	Facilitators, mentors and coaches	Integrate learning with HR practices and other business activities	Business and performance information required for decision-making to individuals and workgroups	Provide learning resources close to work
No blame for genuine mistakes	Web-enabled learning	Develop a picture of overall performance of organisation	Participatory culture	Virtual learning spaces
Share information and concerns openly across all levels and among independent projects	Monitor learning and development resource needs	Develop synergy across levels and functions	Maximise level of competency applied to decisions	Physical learning spaces
Capture and store information, artefacts, and process knowledge from practice	Develop competency-based assets	Facilitate shared learning across projects and the uses of shared learning resources	Adjust decision making process to shorten time required	Balance expenditure on learning resources and learning environment

Table 7.6 and sub-components for managing project WLD

MANAGING PROJECT WLD				
Project Workforce Management	**Developing Workgroups and Teams**	**Managing Workforce Learning and Innovation**	**Performance Management**	**Performance Alignment**
Workforce competencies and critical skills	Develop competency communities	Structured approach to managing learning and development	Establish a performance driven environment	Continually align workforce competencies to business objectives
Capability profile in workforce competencies	Organise existing competence and experience into workgroups in order to develop additional capacity	Motivate and enable workforce competencies	Conduct two-way performance conversations	Align individual and workgroup performance to business objectives
Project workforce planning	Facilitate knowledge and information exchange, creative problem solving, and potential for innovation	Learning options on project sites	Continually discuss ways of improving performance	Standardise workforce practices
Quantitative management	Integrate improvements at individual level into workgroup operating processes	Organise mentoring and coaching activities	Manage and resolve performance problems	Adjust workforce practices to business needs
Strategic project workforce development	Delegate responsibility and authority to workgroups	Deploy innovations and competency-based assets	Analyse and evaluate impact of learning and development practices on performance	Align project performance to organisational objectives

Table 7.7 Components and sub-components for individual worker learning and development

INDIVIDUAL WORKER LEARNING AND DEVELOPMENT				
Career Development	**Individual Learning**	**Whole Person Development**	**Performance Management**	**Performance Alignment**
Define graduated career opportunities around increasing levels of capabilities in workforce competencies	Encourage individuals to make continuous improvements to their personal work processes by analysing their work and making necessary process enhancements	Develop social and communication skills	Setting performance objectives	Provide financial incentives for individuals to align themselves to organisations business objectives
Motivate and guide development of individuals through graduated career opportunities	Develop a training plan to ensure that all individuals have the skills required by their assignments	Develop personal motivation	Conduct performance reviews	Provide career incentives for individuals to align themselves to organisation's business objectives
Periodically counsel individuals about career options	Focus learning and development activities on other objectives once current assignments are mastered	Develop creativity and a pride in work	Discus performance of work continually to identify ways of improvement	Provide special recognition awards for contributions in line with organisations strategic plans
Periodically communicate opportunities for advancement to workers	Make individuals accountable and responsible for making the necessary changes within their individual work areas	Develop a business-like attitude	Monitor, record and evaluate improvement	Provide ownership options as incentive for improved efforts at achieving business objectives
Integrate performance management with individual career development	Measure capability and focus training and development on knowledge, skills and attitudinal deficiencies	Develop personal working life skills	Manage and resolve performance problems	Define clear aspirational targets for individual performance in achieving the objectives of the organisation

7.5 Stage 4 Assessment Tool Development

At this stage, the CLEARDO maturity assessment tool was developed. The assessment tool was designed to enable the construction firms identify areas in workforce learning and development where they are weak and to prioritise resources to improve those areas. Two assessment questions were developed for each of the 100 sub-components. Each question has graduated option answers that when scored provide an assessment of the organisation's maturity in a specific practice. Aggregated results can then be obtained for sub=components, components, domain dimensions and for the overall WLD domain.

7.6 Summary

This chapter describes in detail the process followed in developing the Construction Learning and Development Optimising Model (CLEARDO). CLEARDO adopts the five-maturity level concept of the SEI's CMM (Paulk *et al*., 1993) and PCMM (Curtis *et al*., 2009). The process of development for CLEARDO follows the framework developed and validated by de Bruin *et al.* (2005). Furthermore, the product and design principles outlined by Roglinger *et al.* (2012) were adhered to in order to mitigate criticisms to maturity models. CLEARDO maturity levels were defined by a benchmark set of evolutionary practices represented by best practices in the areas of individual learning, workplace learning and strategic WfD within construction organisations (Knight, *et al*., 2013). Multiple source of evidence (literature, surveys and case studies) supported the identification and verification of the best practices that informed the components of CLEARDO. Focus groups populated and refined the model. The refined model is presented in Chapter 8 of this thesis.

CHAPTER 8MODEL PRESENTATION

8.1 Introduction

This chapter presents the Construction Learning and Development Optimising Model (CLEARDO), a capability maturity model. The presentation comprises a graphic representation of the model, descriptors of its key components, description of its maturity levels and mode of assessment.

8.2 Construction Learning and Development Optimisation Model (CLEARDO)

CLEARDO was designed to enable construction firms to improve WLD capability from an ad hoc and inconsistent level to managed, defined and quantifiable levels leading up to the point where the firm is continually optimising learning capability, and consequently, performance. The model focuses on four key dimensions of WLD in the construction context these being: the individual worker's learning processes; managing WLD at project levels; strategic WLD at organisation level; and building a learning environment within the organisation to support learning at all levels and across functions. The four dimensions are not mutually independent or exclusive but interact and overlap in areas. When adequately resourced and supported, the four dimensions potentially work together to build a strong workforce aligned with an organisation's goals. Table 8.1 shows the dimension descriptors. Table 8.2 shows the component descriptors. The maturity level descriptors are found in Annex 4.4.

8.3 Dimension Descriptors

Table 8.1 CLEARDO dimension descriptors

Dimension	Description
Shaping the Workforce	Strategic management of the organisation's workforce involving determining workforce competencies strategic to the business, outlining a workforce architecture in line with strategic goals, putting in place strategies and policies for continuously developing and adapting the workforce to meet the needs of the business
Building a Learning Environment	A responsibility of management to create and support an organisational environment that is pervaded by a culture of continuous learning, continuous improvement, workforce participation, engagement and empowerment, and a drive for optimal performance. This requires setting up social and physical structures that cut across all levels and functional units of the organisation.
Managing the Project WLD	A responsibility of project management to exploit all the learning potential and opportunities afforded by each construction project to expand the capabilities and competencies of the project workforce, to improve on processes to innovate and optimise performance in line with the project objectives and organisational goals
Individual Worker Learning and Development	A social contract between the organisation and the individual worker whereby the organisation encourages and supports the holistic development of the worker, optimising their performance along an agreed path that meets with the aspirations of the worker for career progression and also aligns with organisational objectives.

8.4 Component Descriptors

Table 8.2 CLEARDO component descriptors

SHAPING THE WORKFORCE	
Components	**Descriptors**
Strategic workforce planning	Determine the workforce competencies strategic to business and outline the workforce architecture, defining the processes that make up each competency and the performance baselines for each process. Enact policy that assigns responsibility and accountability for learning and development of workforce to line management.
Workforce practices	Recruitment and retention strategies, talent and innovation management, developing and maintaining a repository of knowledge, skills and process abilities for each workforce competency
Communication and coordination	Establish communication mechanisms, improve communication skills, coordinate improvement practices and innovations, and resolve conflicts and disputes across levels and functional units
Performance management	Establish desired performance levels for workforce, set targets for projects, business and functional units, provide for and support continuous leaning and development, evaluate and review performance, manage the learning and performance of workforce competencies and processes strategic to business and recognise and reward outstanding performance
Alignment (Organisation level)	Continually align workforce architecture to business objectives, standardise workforce practices across projects and business units, adjust workforce practices to changing business needs, align performance at all levels and across projects with business objectives, develop synergy across projects and business units.

Table 8.2 CLEARDO component descriptors (cont'd)

BUILDING A LEARNING ENVIRONMENT	
Components	**Descriptors**
Learning Culture	Develop a culture of everyday learning and continuous improvement across all levels and functional units, learning from good practice, incidents and even mistakes, creating an environment where knowledge is generated, shared and utilised by the workforce and new ideas are encouraged and tried out and no blame is apportioned for genuine. A culture of documenting lessons learned for future use as learning resource.
Learning Resources	Lessons learned from practice are captured and stored, learning objects, learning modules and learning programmes in workforce competencies and processes are developed and made available to organisation's workforce as audio, video, diagrams and text, in hardcopy, softcopy or web enabled learning. Develop and sustain formal coaching and mentoring programmes
Integration	Counter the urge for compartmentalisation by integrating workforce practices, sharing learning and learning resources across projects and business and functional units, maintaining cohesion and consistency in workforce practices across projects and business units through improved communication, integrate learning with HR practices and other business activities and develop a picture of overall performance of the organisation.
Employee Involvement	Develop a culture of participation and participatory decision making, thereby optimising the level of competency applied to decisions. Encourage and exploit employee engagement, empowerment and participation.
Learning Spaces	Manage the work environment to support learning by providing learning resources close to work, developing and sustaining physical as well as virtual learning spaces for workforce and monitoring and balancing expenditure on learning resources and environment.

Table 8.2 CLEARDO component descriptors (cont'd)

MANAGING PROJECT WLD	
Components	**Descriptors**
Project workforce capability management	Determine workforce competencies and critical skills required for the project, establish the capability profile of the workforce, plan towards meeting the needs of the project, and develop workforce to meet the strategic needs of the project.
Developing workgroups and teams	Organise existing workforce competence into workgroups to develop further capacity, delegate responsibility and authority to workgroups, encourage and support the development of communities of practice, facilitate knowledge sharing, problem solving and innovation, and integrate improvements at individual level into workgroup processes.
Managing WLD	Outline a structured approach to WLD, provide learning options at project site, motivate and enable the learning of workforce competencies, organise and support mentoring and coaching activities, and deploy innovations and competency-based assets
Performance management	Establish and support a performance driven environment, conduct two-way performance conversations, continually discuss ways of improving performance, manage and resolve performance problems, and evaluate impact of learning and development practices on performance
Alignment (Project level)	Continually align workforce competencies to business objectives, standardise workforce practices, align project workforce performance to organisational objectives, adjust workforce practices to changing business needs, align project performance to organisational objectives.

Table 8.2 CLEARDO component descriptors (cont'd)

INDIVIDUAL WORKER LEARNING AND DEVELOPMENT	
Components	**Descriptors**
Career Development	Define graduated career opportunities, motivate and guide development of individual through graduated career opportunities and periodically communicating and counselling individuals about career options
Individual Learning	Develop a learning plan, focusing learning activities on areas of deficiency focusing learning on other objectives once a current assignment is mastered, ensuring that individuals are responsible and accountable for their own learning and development
Whole person development	Ensure a whole person approach to learning and development is adopted ensuring that each individual is equipped with the interpersonal skills, intrapersonal skills, and working life skills in addition to job specific skills that they need for effective learning and performance.
Performance management	Setting performance targets, conducting performance reviews, discuss work continually to identify ways of improvement, and document improvement
Alignment (Individual level)	Provide financial incentives, career incentives, special recognition awards and ownership options for individual enhanced efforts at achieving organisational goals

8.5 Progression Through Maturity Levels

The executive management of a construction organisation seeking to move from the ad hoc, inconsistent level needs to demonstrate a clear commitment to everyday learning and development of the organisation's workforce through clear policy guidelines. These policies need to cover line management and individual worker roles in the process as well as articulate physical and social structures and resourcing required for learning. Organisations seeking to move from Level 2 to Level 3 must have established line managers' responsibility and accountability for the learning, development and performance of the workers who report to them. Workforce practice must be widespread, consistent, institutionalised and encompass every dimension and component before the organisation qualifies to move to the next level. To advance from Level 3 to Level 4, workforce competencies required to achieve business objectives should be determined and defined in terms of the knowledge, skills and abilities required by each competency. Learning and development efforts should then be focused on the identified knowledge, skills and abilities, consequently, improving workforce capabilities efficiently.

To advance from level 4 to Level 5, the organisation must have demonstrated a focus on continuous learning and performance improvement by using statistical and other quantitative techniques to ensure efficiency in learning and development processes and their impact on performance. At Level 5 organisations should be exhibiting continuous everyday learning and improvement in workforce competencies as well as advanced performance management systems that ensure performance improvement is continuous and remains aligned with changing organisational goals.

8.6 CLEARDO Assessment Tool

The framework described in the previous sections provides construction firms with a strategy for progressing towards long term maturity in WLD practice once the current level of maturity is established. The tool provides an aggregated maturity assessment to identify the current learning and development maturity level and provides component level assessments to highlight areas of low maturity that require focused attention.

The assessment tool is made up of five sections, four of which comprise the four domain dimensions under focus and a report detailing the firm's learning and development maturity level. Maturity is expected to occur along all four dimensions: shaping the workforce; building a learning environment; managing project learning and development; and individual worker development. Within each dimension maturity is expected to occur along all five components that make up each dimension. Ten items assess each of the 20 components amounting to a 200-item maturity assessment tool. The assessment tool is included in Annex 4.6 (Appendix IV). A worked example using information from one case study firm (TV1) is provided in Annex 4.7.

8.7 Difference between PCMM and CLEARDO

The CLEARDO differs from the PCMM in the domain, domain dimensions, components and subcomponents. The CLEARDO is context specific to construction and accommodates the project-based nature of construction firms while the PCMM is generic. The CLEARDO in that sense provides a higher level of granularity than the PCMM in response to the complexity of the construction organisation context.

8.8 Summary

This chapter presented the Construction Learning and Development Model (CLEARDO) which was designed to enable construction firms optimise WLD and consequently optimise performance in line with business objectives. CLEARDO, a maturity model, takes constriction firms through five evolutionary levels of maturity starting from an ad hoc, inconsistent and somewhat chaotic level through managed, defined and measured levels to an optimising level where continuous improvement is embedded and institutionalised in the organisation. The process starts with executive management commitment towards WLD and this gradually pervades the organisation.

A maturity assessment tool was presented which when deployed objectively provides a construction organisation with aggregated and component assessments of current learning and development maturity levels and highlights areas of low maturity that require focused attention. The next chapter reports on the testing and validation of the model.

CHAPTER 9 VALIDATION OF THE CONSTRUCTION LEARNING AND DEVELOPMENT OPTIMISATION MODEL

9.1 Introduction

The Cambridge Dictionary of English defines validation as "to make something acceptable or approved especially after examining it". The purpose of validation in research is to ensure the quality of research outcomes (Babatunde *et al.*, 2016; Cheung, 2009). Pidd (2003) refers to validation as a form of quality assurance. In the case of models, methods or approaches to validation vary depending on the type of model (Dery *et al.*, 1993). According to Pidd (2003) conceptual models are not intended to represent the real word and therefore approaches to validation are different from validation appproaches for quantitative models. Conceptual models are, however, developed from a consideration of root definitions of relevant systems and therefore validation for conceptual models would rely on establishing relevance, competent development appropriateness and suitability (Pidd, 2003).

9.2 Validation Approach

The research has two main outcomes: the CLEARDO Model and its assessment tool.

9.2.1 CLEARDO Model Development

9.2.1.1 Internal validation

The model was developed using a validated framework (de Bruin *et al*., 2005) to achieve rigour. Internal validation was achieved through a series of focus group iterations. This research used focus groups to validate the tentative model. The focus groups were in the form of workshops which started with a presentation of the background to the study and the tentative model. Discussions followed to assess the structure of the model and

to populate the model with relevant sub-components needed to complete the model. The first set of three focus groups lasted about 4 hours each, the second rounds each lasted 2 hours while the final round lasted approximately 2 hours. The composition of these focus groups are detailed in Table 7.3. Subsequently, the completed model was validated by top management of the case study organisations to assess the structure of the model, to identify issues not addressed in the model, if any, and to validate the model for relevance, appropriateness and suitability for construction firms in Nigeria.

The overall rating of the model by top management of the case study firm was good. They all considered it fit for use by construction firms in Nigerian. The small firm management, however, were concerned about the cost of implementation for a small firm with few permanent staff. The executive director of the large firm found the model "very interesting" as it touched on several issues that have been discussed at management level but have not found a way to structure into their HR activities. Generally, the model was validated for relevance, acceptability, suitability, appropriateness and usefulness.

9.2.1.2 External Validation

The model was presented to two members of management each from three other construction firms (one large, one medium and one small), different from the case study firms who validated the model for relevance, appropriateness and suitability for use in their organisations. The discussions that followed lasted 1 hour on the average. These discussions were recorded for further analysis. At the end of the discussions a questionnaire was passed round and participants were requested to validate the model.

9.2.2 CLEARDO Model and Assessment Tool

9.2.2.1 Internal and external validity

An email questionnaire survey was conducted to validate the assessment tool. A six-item rating scale which was developed to elicit the perception of experts in the research domain on the degree of appropriateness, objectivity, replicability, practicability, reliability and suitability for use by construction firms in Nigeria. The assessment tool was attached to the questionnaire and was sent by electronic mail to 21 participants. Three participants each represented the six construction firms who participated in the study, while the remaining three were drawn from academia. 9 of the participants from the three construction firms who participated in the initial development of the model provided internal validation, while the remaining twelve provided external validation. Table 9.1 and Table 9.2 give details of all the participants who engaged in the survey. This approach has been used successfully in similar validation studies in the construction domain (Babatunde *et al.*, 2016; Cheung, 2009; Liyanage and Egbu, 2008).

9.2.3 Validity Results

9.2.3.1 External Validity

Twelve questionnaires were sent to the validation survey participants outlined in Table 9.2. All 12 participants responded and the collated results are presented in bar charts in Figure 9.1. The results indicate that Objectivity had the highest rating at 4.78 out of a maximum possible score of 5.00. The lowest score was 4.00 for degree of replicability a high score. Overall result further confirms the validity of CLEARDO. Some other comments made are included in Section 9.2.3.3 and would be helpful in future work to refine the model.

Table 9.1 Internal validation participants

No	Position	Type of organisation	REF	Qualification	Experience
1	Construction manager	Construction firm (large)	CS1	MSc	30 years
2	Construction manager	Construction firm (large)	CS1	MSc	30 years
3	Construction manager	Construction firm (large)	CS1	HND	18 years
4	Construction manager	Construction firm (medium)	CS2	MSc	30 years
5	Construction Manager	Construction firm (medium)	CS2	MSc	18 years
6	Construction manager	Construction firm (medium)	CS2	HND	21 years
7	Managing Director	Construction firm (small)	CS3	MSc	30 years
8	Construction manager	Construction firm (small)	CS3	MSc	9 years
9	Site Manager	Construction firm (small)	CS3	HND	18 years

Table 9.2 External validation survey participants

No	Position	Type of organisation	REF	Qualification	Experience
1	Construction manager	Construction firm (large)	CS4	BSc, MBA	35 years
2	Construction manager	Construction firm (large)	CS4	MSc	30 years
3	Construction manager	Construction firm (large)	CS4	BSc	12 years
4	Construction manager	Construction firm (medium)	CS5	HND, LLB	35 years
5	Construction Manager	Construction firm (medium)	CS5	BSc	12 years
6	Construction manager	Construction firm (medium)	CS5	BSc	7 years
7	Managing Director	Construction firm (small)	CS6	BSc, MBA	18 years
8	Construction manager	Construction firm (small)	CS5	BSc	15 years
9	Site Manager	Construction firm (small)	CS6	HND	18 years
10	Professor	University	U1	PhD	33 years
11	Professor	University	U1	PhD	26 years
12	Professor	University	U2	PhD	25 years

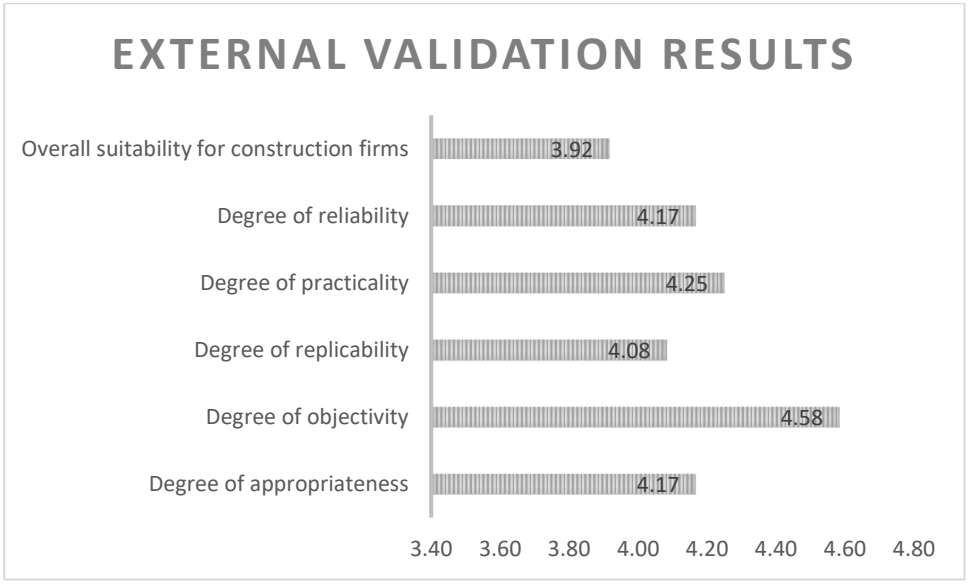

Figure 9.1 External validation results

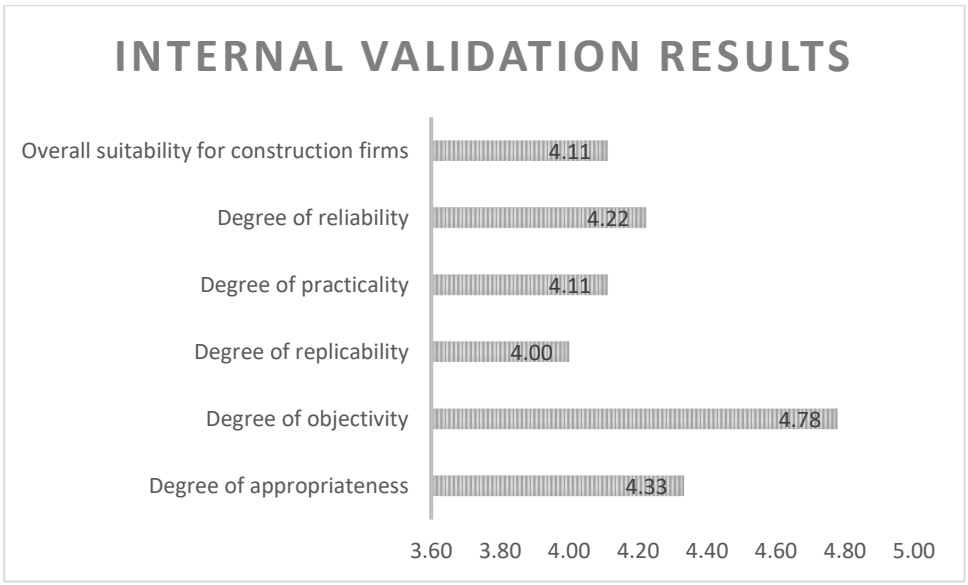

Figure 9.2 Internal validation results

9.2.3.2 Internal Validity

Nine questionnaires were sent to the validation survey participants described in Table 9.1. All 9 participants responded and the collated results are presented in bar charts in Figure 9.2. The results indicate that Objectivity had the highest rating at 4.58 out of a maximum possible score of 5.00. the lowest score was 3.92 for overall suitability for construction firms which is still a high score. Overall result confirms the validity of CLEARDO. Some other comments made are included in Section 9.2.3.4 and would be helpful in future work to refine the model.

9.2.3.3 Comments from internal validators

"The model and assessment tool are excellent but the cost of implementation will be enormous, may have to be spread over years and implemented in stages. If the model is followed to the letter, the organisation will work effectively at optimal cost."

"The model and the assessment tool are well articulated, easy to understand"

"A very comprehensive and realisable assessment tool for construction workforce not only for Nigeria."

9.2.3.4 Comments from external validators

"The model and assessment tool contains relevant metrics, which are logically presented and appropriate for objectively assessing the maturity level of learning and development of construction firms. Developing a computer-based assessment platform will improve the practicality and applicability of the tool by firms in an effective and efficient manner. If the development of computer-based assessment platform isn't part

of the scope of the study, it can be recommended as a potential area that value can be added to the outcome of this research."

"I think the model is good as it deals with level of training and understanding for the work force in the construction industry in Nigeria as it affects the functioning of the work force. The tools employed are assessed to be good and reliable in the context of the program for human capital development."

"This work is versatile, robust and a clear articulation of the developmental and training needs of a typical workforce in the construction industry in Nigeria. Its implementation will facilitate the creation of a huge cache of trained and skilled workforce."

CHAPTER 10 DISCUSSION OF FINDINGS

10.1 Introduction

The primary goal of this research was to develop a dynamic conceptual skills learning and development model that enables construction firms to optimise individual worker performance by integrating effective and efficient learning approaches into the firms existing business models. This was conceived as a structured approach to construction WLD in response to the perceived skills gaps in the construction industry on the one hand (Awe *et al.,* 2009; Dainty *et al.*, 2007; Dainty and Loosemore, 2012; Wang *et al.*, 2008; Wang *et al*., 2010) and, on the other hand, the persistent calls for the industry to transform in order to keep pace with technological and socioeconomic dynamics of an increasingly globalised and knowledge based world (CIOB, 2007; Egmond, 2012; WEF, 2016). Human capacity is key to any transformation process (Nafukho, 2013). Although this is understood by industry, strategic workforce planning and development are rarely a focus of construction firms (Debrah and Ofori, 2006; Kululanga, 2012; Osabutey *et al.*, 2012; WEF, 2016).

Critical debate is usually centred on who should bear the cost in terms of funds, time and effort. Because the industry is predominantly project-based and work is cyclical and volatile, the construction workforce is considered unstable (WEF, 2016). The decision of construction firms not to invest in WLD may therefore seem rational (Dainty *et al.*, 2007). Some argue that the state and the individuals should bear the cost of investment since the benefits of learning accrue first to the individual and therefrom to the society. However, human capacity is currently recognised as a crucial factor in wealth creation and the knowledge and ideas of people are the main resource for economic growth

(NZCER, 2014). Capacity building is a broad concept that spans the whole spectrum of life comprising three segments, these being: first, basic education which provides the foundation for individual development; initial training to provide the individual with core work skills, second, knowledge and industry based professional competencies; and third, continuous workplace and life-long learning to maintain individuals' skills and competencies as work, technology and skill requirements change. It is the third segment of HCD that this research has been concerned with.

The third segment which always takes place within the context of the workplace spans the longest duration, cannot be waived if organisations are to succeed. The reality for the construction industry is that essential parts of the second segment have to take place within the construction firms. In fact, in Nigeria for most intermediate skilled workers, both the second and third segment take place in the construction workplace. Findings from the cases studied in this research indicate that 80% of workers in CS1 (large firm), 33% of workers in CS2 (medium firm); and 80% of workers in CS3 (small firm) joined their respective companies with the basic school leaving certificate only. These workers have learned skills in the firm's workplace and have developed from being unskilled to intermediate skilled worker status all within construction firms where it is claimed that investment in human capital is not likely to yield returns. These findings are not peculiar to Nigeria as evidenced by studies in Tanzania (Debrah and Ofori, 2005; Kikwasi, 2011), Zambia (Muya *et al*., 2006) and South Africa (Hall and Sandelands, 2009).

Furthermore, the average number of years intermediate skilled workers have been employed in CS1 is 13 years and in CS2 is 13 years. Although the small firm CS3 employs very few intermediate and high skilled workers on a full-time basis, it maintains a strong

relationship with the most competent and experienced of the workers during off-the-job cycles such that CS3 has first call on their time during on-the-job cycles. The average number of years of association between CS3 and this core of workers is 12 years. This scenario is typical for most construction firms globally (Chan and Marchington, 2012; Hall and Sandelands, 2009). The implication is that the firm does not lose benefit when the worker leaves at the end of a particular project but remains in a database of workers that the firm can always draw from when the need arises. The key to developing and retaining the loyalties of competent workers either on-the-job or off-the-job are effective WLD practices. This research argues that learning in the workplace is an essential and irreplaceable component of WLD and that construction firms should plan and implement these in line with organisational goals.

10.2 A model for Workforce Learning and Development in construction organisations

Workplace learning takes place in the encounter between the worker's learning processes and the learning environment of the organisation (Illeris, 2004). Jorgenson and Warring (2000) conceive the learning environment as opportunities to learn from the material and social world. Workplace learning takes place in the dynamic relation between the learning processes of the individual, the communities at the workplace (social) and, the enterprise as technical-organisational system (Illeris, 2004). Given this scenario, the efficacy of workplace learning would depend on the effectiveness of the individual learning process and the opportunities for learning created by the workplace environment. The two units were studied separately and each involved a complex set of processes which are not static. They continue to interact and evolve. The learning processes of construction skilled workers at intermediate level have not been the

subject of much research and certainly not in the workplace learning context. This research aimed to fill that gap and to integrate findings into a conceptual model that would have implications for optimising performance.

The underlying concept was to identify the determinants of effective learning and to integrate them together with the best practices for workplace learning and workforce development within a conceptual model aimed at optimising performance. To this end two units of analysis were conceived for the study, the construction worker as an effective learner and the construction organisation as the learning environment. See Figure 10.1.

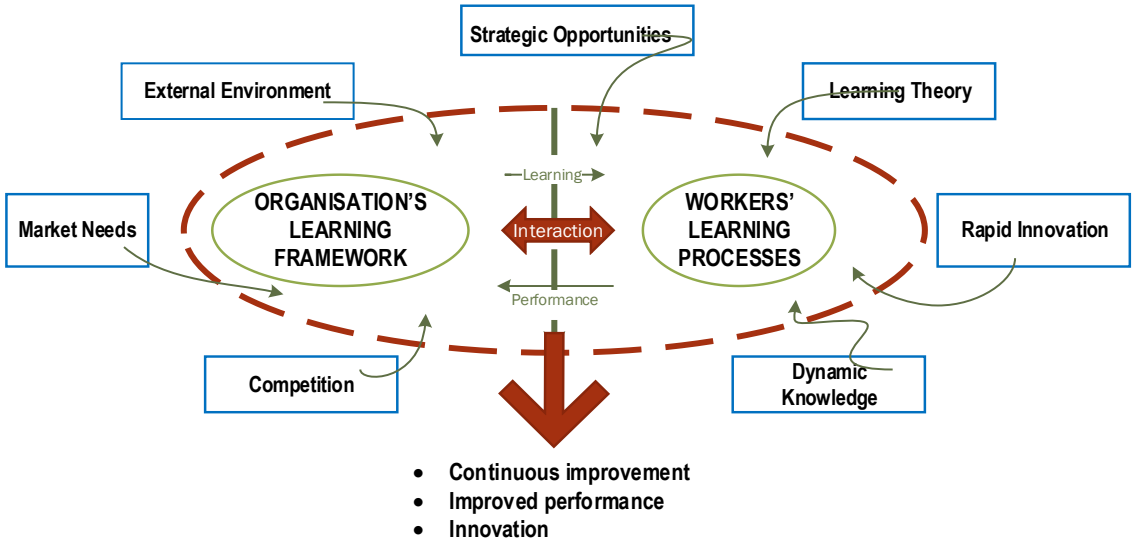

Figure 10.1 Learning and performance optimisation solution for construction firms

Extensive reviews of literature elicited 26 distinct attributes of effective learners and performance while reviews of workplace learning best practice and workforce development best practice together elicited 66 generic items. Preliminary exploratory studies reduced the attributes to the nine highly significant items for further study. These nine attributes were tested among intermediate skilled workers in three case

study construction firms in relation to performance. The preliminary exploratory studies also engaged construction managers working with construction contractors in Nigeria to contextualise the 66 generic workplace learning and development best practices for significance in the construction workplace. The 51 significant practices that emerged from the exploratory studies were categorised into 16 components which were later validated during the interviews with senior management, management, supervisors, technicians and craftsmen in the case study firms. The 16 components were expanded to 20 components from further reflection, and abstracted into four dimensions with five components in each dimension. The four dimensions essentially separated WLD practice at individual level, project and organisational levels.

This is a key contribution to WLD knowledge in construction organisations because, the largest proportion of the workforce is employed at project level and it is at this level that the productivity of the organisation is tested. A critical success factor for workplace learning is that line managers take responsibility for the learning and development of the people who work under them (Castledine and Renwick, 2012; Eraut, 2004; Grugulis, 2003; Ness and Green; 2012). This is unlikely to happen if responsibility for training and development is at organisational level, particularly where the project site is far removed from head office or the organisation is involved in several projects at the same time.

The exploratory study findings rated “establishing line management responsibility and accountability for subordinates” 0.62 for relative importance which was considered significant. The case study interviews revealed that this was typical for intermediate skill learning and development. Typically, a new recruit on their first day is handed over to a more experienced worker, a gang leader or headman to “put them through” or show

them the ropes". Interviewees (headmen) describe how they coach and mentor "helpers" or "labourers" (those who show an interest) to levels of competence. The content of learning, method of teaching, techniques employed and learning resources are left to the headman. The organisation has no vested interest in the learning and development of either the recruit or the headman and holds neither of them accountable. This implies an ad hoc, and unstructured approach to this significant aspect of WLD. Within CLEARDO establishing responsibility and accountability is the first step in continuous improvement. Providing the necessary support in terms of training for the line managers, a framework on which learning and development activities are based and recognition and or reward when defined objectives are achieved, are essential elements of workforce learning and development and these have been incorporated into CLEARDO (Dainty and Loosemore, 2012).

Performance management and alignment of WLD activities is an essential component of WLD at this level and the line managers are responsible for the performance appraisals and the necessary discussions entailed. Raiden and Sempik (2012) argue that the process is subjective and also time consuming and suggest 360-degree performance appraisals to reduce subjectivity. 360-degree assessments are included in the performance management component of CLEARDO. The time and effort taken to conduct 360-degree assessments and discussions will be more than compensated for in efficiency in other areas of WLD such as formal training, whole person development, development and retention of talent (Hoover *et al*., 2010; Poortman *et al*., 2011). Furthermore, the automation of labour data collection and analysis is likely to reduce the time and effort spent on some aspects of performance management and this has been considered within CLEARDO. For instance, assessments can be carried out online,

and analysis and reports generated by appropriate software. Subsequent discussions may only be necessary if there are unresolved issues.

Workgroups and teams are inherent in construction operations and it was found that they are also underutilised by construction firms as facilitators of learning, development, performance optimisation and innovation. Raiden and Sempik (2012) opine that construction may have lost an opportunity to lead the field in developing teams for overall performance optimisation. Presently, they are used as a method of reducing cost or to improve logistics. However, they could be structured to provide much more benefit, including WLD. This component received a high significance rating of 0.86 from construction managers and showed inconsistent and non-formalised practice within case study firms. Communication another key component of WLD received a high significance rating of 0.80 from construction managers but slow uptake from the cases study firms particularly the large construction firm. Communication and coordination are key components of CLEARDO.

Chan and Marchington (2012) argue that WLD focuses much attention on the agenda of managers and the organisation's objectives and ignores the genuine involvement and participation of workers. For instance, where there is conflict between a worker's career aspirations and the organisation's strategic direction, the organisation wins out because the organisation holds the power in the dynamic. This research holds the view that the organisation appears to win out because they pay the wages, but the worker has the power of choice of who pays their wages. The point being made here is that a social contract exists between the organisation and its workers and is based on each party offering something that the other party needs.

Once those dynamics change then the contract falls apart and a different agreement has to be reached and if that is not possible then the parties go their separate ways. For instance, one of the interviewees (craftsman) was involved in self-directed learning to gain certification in operating a tower crane. The interviewee had paid for the training, attended the course in their own spare time and was close to certification. The question was, seeing as the organisation is unaware and uninvolved in their learning and development programme, what happens when they complete the certifications? The response was that the interviewee would apply for the new position and would move to another organisation if the position was not available in the current one. Agreement (not compromise) is essential for establishing the social contracts required in WLD optimisation. This mutually satisfying agreement is easier to reach where the worker is involved or participates in the business and knows where the organisation is going and the organisation is also involved in the worker's career development.

Another objection to WLD is that much HRM literature applies to coherent entities and not to the "chaordic" (Raiden and Dainty, 2006) nature of construction work (Chan and Marchington, 2012). This research distilled generic practices from literature and filtered them through four strata of construction industry experts to arrive at the final components of the CLEARDO model. It is pertinent to note that some of these WLD practices are practiced by the construction firms albeit in an unstructured an inconsistent manner. This was also the case in Raiden and Dainty (2006) with a UK construction case study organisation.

Finally, Chan and Marchington (2013) argued that HRD should not be considered at organisational level but rather between networks of groups of firms, and that part of

the solution to HRD can be found in the VET system coordinated by the state. This research is of the view that whatever the routes considered and adopted at state level for VET, there is an aspect of HRD that will always be at the organisation level and even project level. For instance, the VET system offers learning and development for 3-5 years at the most. A major component of that VET is best carried out within construction firms and on project sites. Learning and development beyond school is still required for the rest of working life and that must by definition take place at organisation and project level.

This research was focused on developing WLD options that work for the construction workplace. The research sees the construction workplace as a rich arena for the learning of construction skills. Every day on a construction project is an opportunity to learn and develop knowledge and skills and the opportunities may never be replicated. Innovation in processes, techniques and methods are more likely to be generated, developed and tested on project sites. The challenge would be in turning a construction organisation into a continuously learning and developing entity where WLD is part of every work day and HRD practices evolve along the lines of the organisation's strategic direction and the aspirational needs of workers are incorporated.

At the organisational level, WLD practices that emerged are: strategic workforce planning; alignment; performance management; communication HR strategies; building a learning environment with a culture for learning, knowledge sharing and continuous improvement; and supporting learning with knowledge resources and tools (Abdel-Wahab, *et al.,* 2008; Ayoo and Lubega, 2014; Carrim and Basson, 2013, WEF, 2016). Knowledge capture and storage in searchable repositories can be facilitated by digital

technologies. Diffusion of knowledge may also be achieved through digital media, computers, tablets, smartphones, and social media networks (Bowden *et al*., 2006; Bryde *et al.,* 2013; Oblinger, 2012). The challenge may simply be that of changing mindsets.

The integration of learning at project levels is important (Alashwal and Abdul-Rahman, 2014). This is because it is at these levels that the productivity of a construction organisation is tested. Every other activity of the organisation exists to support the successful completion of the project and the highest proportion of the workforce is engaged in work at the project level. WLD practice at the project level can be achieved through on-the-job learning methods such as coaching, mentoring, observing, imitating, real-life problem solving, hypothesis testing, and job-shadowing. These can be complemented with off-the job learning in partnership with external learning providers such as education, training, other construction firms, and equipment and material suppliers. Self-directed learning also provides a viable contribution to learning at this level where knowledge sources are provided close to work locations.

WLD plans for individual workers need to be jointly agreed between HR and the individual worker by balancing the organisation's future skills requirements with the individual's career choice and progression route. This gives the worker the motivation to learn and also a sense of value, purpose and ownership within the organisation. This research argues that properly implemented, a win-win result is achieved with a purposeful, driven and satisfied workforce continuously learning and improving towards achieving the organisation's business goals with the promise of innovation.

10.3 Chapter Summary

This chapter discussed the key finding of the research and has responded to some objections to workforce development at organisation level. The CLEARDO maturity model that was a key deliverable of this research incorporates the mitigating components to the objections within its four dimensions: shaping the workforce (organisation level); building a learning environment (organisation wide); managing project workforce learning and development; and individual worker learning and development. Features of the CLEARDO model were presented in Chapter 8. The next chapter concludes this thesis.

CHAPTER 11 CONCLUSION

11.1 Introduction

Optimising performance is a fundamental goal of construction firms and skilled (intermediate and high) workers are critical for implementing the technical and operational strategies for achieving this. The overarching goal of learning and development is working competence and the primary outcome is expertise or superior performance (Lucas *et al*., 2012). The intention of this research was to firmly link construction business with the learning domain. The concept was to understand how individuals learn and develop at work and how this process can be enhanced allowing for performance optimisation in line with an organisation's business goals.

This integration of learning and work has become very important for several reasons. One of them being the growing recognition of human capital as a more critical factor in wealth creation than physical capital (NZCER, 2014; World Bank, 2000). Another reason is that the key resources for wealth creation are knowledge and ideas and these are embedded in human capital. The nature and character of knowledge itself has changed. Not only does it change and increase in volume rapidly, it also has been made ubiquitous by technology (Manuti, *et al*., 2015). Learning every day or continuous life-long learning is now a requirement for working life and the construction industry needs to address these issues in its transformation process WEF (2016).

Integrating learning and development best practice into construction business was therefore the focus of this research which was aimed at developing a conceptual learning and development model that will enable construction firms to optimise

individual and corporate performance in line with their business goals. This chapter concludes the research study.

11.2 Key Observations and Findings

In order to achieve its aim, the research had six stated objectives. This section reviews the key findings at each stage of the research.

Objective 1: To critically analyse and evaluate the core issues of learning and their application in construction industry knowledge requirements and learning provision.

In order to achieve Objective 1, a review of extant literature was conducted. The review identified core issues of learning techniques and application of learning in the knowledge age. Theories of learning, classic and contemporary as well as digital age learning paradigms, were discussed (Carneiro, 2010; Siemens, 2004; Steffens, 2015). The influence of these theories on the organisation of construction skills learning systems in various countries and the resultant effect on available competencies in the construction industry were analysed.

The provision of construction skills learning in Nigeria was examined, identifying the weaknesses and strong points (Awe *et al.,* 2009*;* Medugu *et al.,* 2011). The key findings were that available construction skills learning supply systems globally were weak and needed to be addressed (WEF, 2016). The state of construction skills learning in most African countries was of concern to a number of authors (Kikwasi, 2011; Kululanga, 2012; Muya *et al*., 2006) and this has been heightened by the African infrastructure

development initiatives that are expected to increase construction activity on the continent in the short to medium term (Ene *et al.*, 2016; WEF, 2015).

The review also highlighted a compelling argument for learning and development programmes in the construction workplace. The fast-paced advances in knowledge, advances in technology, and easy access to information ensures that knowledge, skills and competences rapidly become obsolete and new knowledge, skills and competences need to be learned (Manuti *et al.*, 2015). Continuous lifelong learning, workplace learning and adult learning have therefore taken on greater significance. The capacity to know more has become more important than what is known (Siemens, 2005). This highlighted the central role of the learning process in individual career development and organisational success (Manuti *et al.*, 2015).

Furthermore, the review covered the individual learning process to understand the mechanisms for improving efficiency. Earlier positivist theories of learning focused on the cognitive attributes of individuals in learning (Boghossian, 2006; Bush, 2006; Hung, 2001; Yilmaz, 2011). Social constructivists highlighted the importance of social interaction in the process of learning (Lave, 1991; Lave and Wenger, 1991) while the humanists argued that the emotional aspects provided the motivations and drives to learn (Maslow, 1943). More recently it has become increasingly accepted that an individual's learning takes place in three dimensions, the cognitive, the social and the emotional (Boyatzis and Ratti, 2009; Hager, 2004; Illeris, 2002). Given these insights, the individual as a learner and a worker was selected as a unit of analysis and the construction organisation as learning environment was selected as a second unit of analysis in the research. Individual cognitive, emotional and social attributes that

contribute to and enhance learning and performance were identified from literature. Workplace learning theories were further explored to identify key features.

Objective 2: To critically analyse and evaluate the business perspective on workplace learning, application of learning, and workforce development practice.

To achieve Objective 2, the research reviewed WLD from the business perspective and how this aligns with the construction firm's main order of business. The review found that learning was linked to individual performance and individual performance aggregates to organisational and to national performance (Klein *et al*., 1998; Kumaraswamy, 1997; Tabassi *et al.,* 2011; Vaughan, 2008). Organisational business strategies incorporate HR strategies based on the realisation that HR is critical for growth and business success (Campbell *et al.,* 2011; Stiles and Kulvisaechana, 2003). The review found that from a business perspective, therefore, organisations need competent workforces to optimise organisational performance and HRD is key in developing the needed competencies (Dainty and Chan, 2011). The review noted that the construction industry has faced HR challenges and structured and innovative approaches to WLD within construction organisations are required (WEF, 2016).

Strategies for integrating learning and work were identified (Bowes, 2008; Harrison, 2009; Sambartolo, 2015). Nigerian construction skills learning and development was reviewed as a foundation to the investigations in order to characterise the Nigerian construction industry, to evaluate the supply of construction skills learning, and to determine WLD practice within construction firms (Awe *et al*., 2009; Medugu *et al.,* 2011).

Objective 3: To assess the Nigerian construction industry for intermediate skills knowledge requirements and learning provision; and for workforce learning and development practice

To achieve Objective 3, the research carried out a preliminary exploratory study of the Nigerian construction domain to characterise it for knowledge requirements, to assess the various construction skills learning providers and to explore in context the individual attributes that contribute to effective learning and performance as well as WLD best practices applicable to construction firms.

The preliminary exploratory studies found that the Nigerian construction industry exhibits many of the characteristics of Taylor-Fordist systems identified from literature such as strict division of labour, low use of technology, high levels of supervision, and the need for middle level management on sites. Conversely, the industry also shows some tendencies towards knowledge based systems to the extent that construction workers are multi-skilled, they carry out a variety of tasks on construction sites, and are allowed authority to make decisions concerning their specific area of activity on construction sites (Washington, 1998; Ardichvill, 2003; Brockmann, Clarke and Winch, 2008). The exploratory study also found that the informal apprenticeship system provides the most skills in terms of numbers to construction sites but is ranked ninth out of ten in quality. This agrees with the findings from literature (Awe *et al.,* 2009, Medugu *et al.*, 2011). Construction firms are perceived to provide the best training of construction skills within the Nigerian context. This agrees with situated learning theories (Lave, 1991) and suggests that there is a viable opportunity for improving on

the supply of construction skills provision in Nigeria through workplace learning strategies within construction firms.

The perceptions of the construction domain experts in Nigeria on the development of skills indicate that emotional and cognitive attributes are required in addition to technical skills for the individuals to perform construction skills expertly. This agrees with current thinking on learning and performance (Hoover *et al.,* 2010; Poortman *et al.*, 2011; Illeris, 2007). The cognitive skills identified as being significant for learning and performance are technical skill, underpinning knowledge and numeracy skills. Motivation, creativity and craftsmanship are the significant emotional attributes required by individuals for optimal performance of construction skills while communication skills, business-like attitudes and social skills are the social attributes required by individuals for optimal performance of construction skills.

Of the 66-best practices in WLD synthesised from literature, 31 were rated as very significant, 28 were rated as significant and 7 were rated of low significance. The very significant and significant were then categorised into the following 16 components which formed the basis for the semi-structured interviews during the case study phase of the research: employee involvement; developing workgroups and teams; Alignment; whole person development; project workforce management; managing workforce learning; individual worker career development; learning resources; learning spaces; integration; performance management; managing workforce learning and innovation; individual learning; learning culture; workforce practices; strategic workforce planning.

Objective 4: *To examine the interrelationships and interdependencies of individual attributes and factors of job performance to understand the underlying push-pull forces that deliver or impede effectiveness of learning and performance*

Objective 4 was achieved within the case study firms and sought to provide empirical evidence for a whole person approach (Hoover *et al.,* 2010; Poortman *et al.,* 2011) to WLD, specifically at intermediate skill level (craftsmen, technicians and supervisors). The key findings were that cognitive abilities and also social and emotional attributes associated significantly with individual performance. Specifically, for all three construction firms, the cognitive attributes measured by GMA and numeracy skills correlated strongly with performance therefore agreeing with established studies (Schmidt and Hunter, 2004). However, motivation, communication skills, social skills (Ferris *et al.*, 2001), business-like attitude, creativity and craftsmanship were other attributes that correlated significantly with performance (Boyatzis and Ratti, 2009) for all three construction firms.

Objective 5: *To develop a conceptual learning and development model for optimising workforce performance in line with the strategic priorities of construction firms*

Objective 5 was met with the development of a conceptual construction learning and development model (CLEARDO) which integrated workplace learning best practice, individual attributes for learning and performance and organisational strategy into a conceptual maturity model that enables construction firms to improve their WLD maturity through an evolutionary path from ad hoc and inconsistent levels, through managed, defined and measured levels to optimising levels (Curtis *et al.,* 2009; Paulk *et*

al., 1993). The model is supported by a tool which assesses the organisation's current maturity level and highlights areas of low maturity for specific focus. The model was developed within three construction firms in Nigeria. The process commenced with two interrelated studies within each case study firm.

On one hand, were psychometric tests to deepen understanding of the individual learning processes of construction workers (craftsmen, technicians and supervisors) in the construction workplace and the impact on performance. That aspect of the study was achieved in Objective 4 of this research. The implication of the results of the assessments and correlational studies was that optimising individual learning and performance is achieved by developing and strengthening an integrated set of individual attributes that are in the main specified by context and by previous learning. The sets of attributes are therefore variable in relation to context and variable in relation to work groupings. In addition, the sets of attributes are variable with respect to the individual and are made up of cognitive, emotional and social attributes interacting to optimise learning and performance and by implication, prescribing what has been described as a whole person approach to learning and development (Poortman *et al.,* 2011).

On the other hand, the study of the construction firms provided a deep understanding of the construction workplace as an effective and efficient learning environment in order to optimise performance in line with business goals. This aspect of the study sought to contextualise the set of WLD practices within the case study firms. The results from the two studies were integrated to outline a hierarchical structure made up of four dimensions and twenty components which comprehensively and exhaustively defined a WLD solution for performance optimisation within construction organisations. The

model development continued from this tentative solution through an iterative process of populating and refining to achieve a construction learning and development optimisation maturity model. The development involved three focus groups from each of the three cases study firms and three iterations of population and refinement.

Objective 6: To test and validate the conceptual learning and development model to confirm construct validity, functionality and replicability

Objective 6 was achieved when CLEARDO was validated internally within the three case study construction firms (participant validation) and external validity was provided by three other equivalent construction firms as well as members of the academia in Nigeria. The model was validated for relevance, acceptability, appropriateness and suitability for Nigerian construction firms (Babatunde *et al.,* 2016; Cheung, 2009; Liyanage and Egbu, 2008).

11.3 Contribution to Knowledge

This research has implications for both the theory and practice of learning in a construction environment/setting. Much has been studied and written about construction skills development from the perspective of policy, education and training (Brockmann *et al*., 2008; Clarke and Wall, 2000; Clarke and Wall, 1998; Clarke and Winch, 2004; Syben, 1998; Wang *et al.,* 2008) or the unavailability and poor quality of intermediate skills as an indictment of policy, education and training (Abdel-Wahab, 2012; Agapiou *et al.,* 1995; Awe *et al.,* 2009; Dainty *et al.,* 2005; Jayawardane and Gunawardena, 1998; Kikwasi, 2011; Mackenzie, *et al.,* 2000; Medugu *et al.,* 2011; Muya, *et al.,* 2006; Root and Wachira, 2009). However, little research exists in HRM in

construction despite widespread acceptance of the importance of human capital to organisations, industries and economies (Dainty and Loosemore, 2012) and despite the worsening of skill shortages globally (WEF, 2016). The shift to the knowledge economy has highlighted life-long learning and continuous improvement (Dainty and Loosemore, 2007; WEF, 2017). Learning has become a factor in global competitiveness and workplace learning is a huge part of this (Manuti *et al.,* 2015).

This research has critically examined the core issues in learning, workplace learning and workforce development in relation to performance within the construction environment. The main achievements of this research in terms of contribution to knowledge can be summarised as the following: understanding of the intermediate construction skill provision situation in Nigeria; understanding of the knowledge requirements of the construction industry in Nigeria; understanding of the key individual attributes that underpin performance of intermediate construction skills in Nigeria; understanding of the effective methods in the learning of intermediate construction skills in Nigeria; understanding of the contextual issues that support the learning of intermediate construction skills in Nigeria; exploration of the key individual attributes that are highly associated with performance of intermediate skilled workers in the context of large, medium and small construction firms in Nigeria; an exploration of the motivations that underpin the performance of intermediate skilled workers in large, medium and small construction firms in Nigeria; an identification of the enablers and drivers to achieving continuous improvement in WLD in construction firms in Nigeria; development of a WLD solution that enables construction firms to optimise performance; and development of an assessment tool to enable construction firms to measure their WLD potential as basis for implementing improvement strategies. The

following sections discuss the implications of these contributions to both theory and practice.

11.4 Contributions to Theory

The findings from the preliminary exploratory studies conducted in Nigeria characterised the Nigerian construction industry as industrial age but with evidence of moving towards knowledge age societies characterised by fast pace of knowledge expansion, diffusion and obsolescence, technological change and easy access to knowledge. The implication of these for knowledge age industries is that continuous learning and continuous improvement of workforce become critical factors for survival. The research evaluated the existing providers of learning in intermediate skills in construction for quality and quantity and firmly linked learning and the construction domain by examining the contextual variables that impinge on learning such as the effectiveness of various pedagogical approaches on construction sites and the learning variables that impinge on learning in the construction workplace. The research also identified coaching as the preferred method for teaching and learning of intermediate construction skills in the construction firm context. Illeris (2007) theorises that coaching, mentoring and such guided support are essential for strengthening learning in the workplace. This view is supported by literature (Cullen, 2002; Cunningham *et al.,* 2013; Eraut (2004); DeTuncq and Schmidt, 2013, Horwitz, 2013; Lucas *et al.,* 2012; Manuti *et al.,* 2015; WEF, 2016; Zhang *et al.,* 2013).

The research also identified the enablers and drivers of WLD in construction organisations. The preliminary studies also found that the key individual attributes evident in intermediate skilled workers in construction included emotional (motivation,

creativity, craftsmanship) and social (communication skills, social skills, business-like attitude) attributes in addition to the expected cognitive attributes (technical skill, underpinning knowledge, numeracy skills).

From the psychometric evaluations within the case study organisations (large, medium and small construction firms), the research clarified the influence of emotional and social attributes on construction intermediate skills performance in the construction workplace, an area previously not considered by researchers. The research therefore extends literature on the interaction of cognitive, emotional and social attributes on construction skills performance. The motivations of intermediate skilled workers in relation to their performance in the context of large, medium and small construction firms was explored and the research found that the" intrinsic motivation to know" was most strongly associated with performance than any other motivation type investigated and this was the same for all three cohorts. This suggests a strong link between learning and performance, a claim made by learning organisation researchers (Goh *et al.,* 2012). Various learning organisation theorists have made positive links between learning and performance at organisational level (Milia and Birdi, 2009; Prieto and Revilla, 2006; Hung *et al.,* 2010). Very few studies have been conducted on the learning process of construction craftsmen, technicians and supervisors nor has it been linked to performance. This research has contributed to knowledge and expanded the literature in this scantly researched area.

The interviews within the case study construction firms validated the identified enablers and drivers for achieving continuous improvement in WLD for each of the firms. The validated enablers and drivers formed the main components of a construction WLD

optimisation model. Another level of consensus was reached on the validity of these enablers and drivers (key practices) during the focus group iterations. The CLEARDO model which emanated from this rigorous process is representative of the views and perceptions of a wide range of highly experienced practitioners in the Nigerian construction industry from top level management to skilled labourers in construction firms, construction/project managers across Nigeria and academia on construction WLD. In this respect, it can be considered a fair representation of the learning and development subsystem of the complex domain of construction. Furthermore, CLEARDO rests on an empirical foundation and includes a valid, reliable and cost-effective capability assessment method.

The research synthesised a tentative solution for the model comprising four dimensions, each with five components using constant comparison principles. Three focus groups in three iterations, populated and refined the model. The model focuses on four key dimensions: strategic WLD at organisation level; building a learning environment within the organisation; managing WLD at project levels; and the individual worker's learning. The four dimensions are not mutually independent or exclusive but interact and overlap in areas. However, when adequately resourced and supported, the dimensions potentially work together to build a strong workforce aligned with an organisation's goals. The model was found to be appropriate, objective, replicable, practical, reliable and suitable by a panel of experts. Consequently, this research contributes to knowledge a unique pedagogical tool that potentially combines the individual worker learning process, the organisation's learning culture and environment, opportunities for learning on construction projects and strategic management to provide optimised performance.

11.5 Implications for Policy and Practice

Contributions to learning at organisational, project, team/crew/work group and individual levels are essential within construction firms. At the individual level, the learning of construction skills and the factors that ensure effective learning were investigated within the construction firm environment. These factors include individual attributes that effect performance, the pedagogical approaches that deliver the desired individual attributes efficiently, and the contextual variables that impinge on learning (Felder and Silverman, 1988; Goulding and Syed-Khuzzan, 2014). The implication is that businesses can tailor learning solutions to meet both the needs of the individual worker to perform and the organisational requirements for achieving business goals, eliminating the waste associated with generic, 'mass-produced' solutions (NZCER, 2014).

Significantly, existing literature on workplace pedagogy applicable to construction business environments is somewhat scant. Acknowledging this paucity, this research makes the following contributions to workplace leaning. At organisational level, WLD practices that emerged from the research as key practices were: strategic workforce planning; aligning HR strategies with organisational business objectives; building a learning environment with a culture for learning, knowledge sharing and continuous improvement; supporting learning with knowledge resources and tools; and information/knowledge capture, storage and diffusion. These key practices are components in the CLEARDO model specifically developed to enable construction firms optimise individual performance and subsequently organisational performance.

Literature generally recognises learning at organisation, group and individual levels. The research adopted the view that due to the project-based nature of construction, the integration of learning at project levels is critical for WLD (Ene *et al.,* 2016). This is because it is at these levels that the productivity of a construction organisation is tested. Every other activity of the organisation exists to support the successful completion of the project and the highest proportion of the workforce is engaged in work at the project level. In this regard, providing learning resources and learning spaces close to construction sites is a key element of CLEARDO. Learning resources could be digital and even provided online. Learning spaces include physical and virtual. Furthermore, CLEARDO emphasises the use of a variety of learning methods suitable for project sites such as coaching, mentoring, observing, imitating, real-life problem solving, job-pairing and job-shadowing. These also need to be complemented with off-the job learning in partnership possibly with external learning providers such as education, training, other construction firms, and equipment and material suppliers.

The individual learning dimension of CLEARDO is about social contracts between the construction organisation and individual workers whereby the organisation's future skills requirements are balanced with the individual's career choice and progression route. This provides the worker with both the motivation to learn and to perform, and in addition a sense of value, purpose and ownership within the organisation. In this respect, if properly implemented, a win-win result is achieved with a purposeful, driven and satisfied workforce continuously learning and improving towards achieving the organisation's business goals and with the promise of innovation.

On the premise that knowledge is dynamic and learning needs to be continuous, the learning and development model, enables construction firms to provide the appropriate learning environment needed for continuous targeted WLD. By examining empirically, the impact of cognitive, emotional and social attributes of individuals on performance, this research added to the knowledge and understanding of how construction skills performance can be enhanced in individuals, enabling construction firms to appropriately deal with problems of underperformance while maintaining a motivated and performance driven workforce. (Eraut *et al.,* 2000; Illeris, 2007; Leung *et al.*, 2014; Wood *et al.*, 2014). The development of the attributes within and influenced by environmental factors in the business/workplace empowers individual performance and also the construction firm in which the individual operates (Zhang and Fan, 2013). Such an integrated and structured approach to the learning of construction skills has been lacking in existing literature on construction skills development which has focused on the policy and institutional provisions of learning for intermediate skills (Wang *et al.*, 2010; Tabassi *et al.*, 2011).

11.6 Limitations of the Research

This research is firmly situated in the complexity of the construction domain, integrating the diverse processes, perceptions, culture, experiences, practices, and interactions involved in learning, construction management and organisational development. The research is built on interrelated theories to develop, and validate a conceptual model exclusively within a construction environment.

This research was approached through a pragmatic lens. Ontologically and epistemologically, the research adopted a social constructionist-interpretivist approach.

Furthermore, a mixed method approach was considered appropriate for gathering deeper insights and understanding of the complex construction domain. Quantitative and qualitative methods and techniques were employed to achieve the objectives of the research identified in Section 1.4. These techniques included several surveys and case studies. Data collection tools used were Likert type questionnaires, standardised psychometric tests (Guay, *et al.,* 2003; Wonderlic, 2002), adapted psychometric tests (Kline, 2000; Messer and Harter, 2012; Queendom, 2015) and semi-structured interviews. Statistical analysis for the quantitative data included, descriptive statistics and correlational analysis. Constant comparative principles guided the extraction of themes and categories from the qualitative data (Saunders *et al.,* 2016). A range of cross-case matrices were employed to integrate diverse data (Miles and Huberman, 1994).

The preliminary surveys were conducted to reduce the large number of variables to the most significant for further investigation. The data did not lend itself to factor analysis due to high correlation between variables and very low proportion of sample size to number of variables. Efforts were made to garner the opinions of a diverse and wide range of construction domain experts using 4 point Likert scales. The “forced choice” option was selected because in the first instance, the participants were domain experts who were expected to have a decided opinion about the matter under study and in the second instance participants were expected to describe themselves and their behaviour in certain situations. This did not allow for either an undecided or unsure position (Coolican, 2014; Leung, 2011).

The 26 personal attributes identified from literature as factors in effective learning and performance were reduced to the nine most significant based on the nationwide questionnaire survey in Nigeria. The rationale for reducing the number of attributes to the most significant was the Pareto principle which states that roughly 80% of the effects come from 20% of the causes (Kramp, *et al*., 2016). This research does not offer any evidence that the remaining 17 attributes are not pertinent to learning and performance. The selected nine attributes were cognitive attributes (technical skill, underpinning knowledge, and numeracy skills), emotional attributes (motivation, creativity, and craftsmanship), and social attributes (communication skill, social skill, and business-like attitude). However, technical skill and underpinning knowledge were dropped from the study because appropriate methods for measuring them were beyond the scope of this research. Cognitive ability was subsequently operationalised by GMA.

Case studies were conducted within three construction firms which were selected for theoretical replication rather than literal replication. The small sample size allowed for analytical generalisation rather than statistical generalisations (Yin, 2014). Validation of the psychometric tests adapted for measuring creativity, craftsmanship, communication skills, social skills and business-like attitude was not carried out as this was considered beyond the scope of this research. The empirical studies that examined the relationship between individual worker attributes and performance were carried out within each of the cases study firms; and as such was deliberately context-specific. The mix of attributes identified in each context are therefore specific to the prevailing organisational environment-which can be difficult to replicate.

The CLEARDO model was developed within three case study firms and were validated within a different set of three construction firms in Nigeria. The result of the validation process gives credence to the assertion that the model does have wider applicability than the contexts in which it was developed. Due to limitation of time and resources, the CLEARDO assessment tool could not be developed further as a computer-based assessment tool. The following section discusses additional opportunities to build on this research in order to further strengthen and refine its *modus operandi*.

11.7 Future Research

Acknowledging the limitations of this research outlined in section 11.5, key pertinent issues for further research are considered in this section.

Extending the individual worker learner studies to other construction contexts will deepen the findings of this research. This would require the validating of the non-standard psychometric tests and possible interdisciplinary collaboration. The studies could be widened to include the other attributes that were not investigated within the scope of this research. The benefits of such studies are in the insights that will be brought into the learning and performance processes of this critical cadre of the construction workforce. The possibilities of improving the effectiveness and efficiency of workplace learning constitutes an immense contribution to theory and practice. The study of the relationship between the individual attributes and performance was limited to the correlational. Causal studies would deepen knowledge in this area even further.

Further development of the CLEARDO model for practical use, essentially by automating the assessment tool will generate scores and reports in a more user-friendly manner the would be of immense benefit to construction firms.

The research could also extend to investigating the cost efficiency of implementing a workforce learning programme in a construction firm.

11.8 Summary

Although construction organisations are not traditional learning institutions *per se*, they are rich sources of a wide variety of knowledge. Where relevant and current knowledge from within and from outside the organisation is made accessible to workers at all levels and the human capability to process, utilise and produce new knowledge is developed and activated, the potentials for individual and therefore corporate performance optimisation may be greatly improved.

The Nigerian construction industry needs to respond proactively to the challenge and opportunities presented by the expanding construction activities envisaged in the country. Given the need for a knowledgeable, skilled and capacitated workforce in the Nigerian construction industry and the immense potential that individual construction organisations have for transformation in this area, this research presented a structured approach for shaping and developing the WfD systems of organisations, integrating learning at individual, project and organisational levels. Knowledge generation and diffusion systems have so increased in efficiency that keeping up with advances in knowledge has become a real challenge. Theories of learning in the knowledge and digital age such as Connectivism therefore consider an individual's capabilities to learn

more to be more important than the quantum or quality of what an individual already knows. It is evident that the education system in Nigeria cannot provide construction organisations with all the capabilities needed to cope with increasingly complex construction projects. To develop and maintain a capacitated workforce, construction organisations must therefore continuously update and re-tool their workforce in a strategic and sustained manner and the Construction Learning and Development Optimising Model (CLEARDO) developed through this research is a positive starting point.

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APPENDICES

APPENDIX I LITERATURE REVIEW

ANNEX 1.1 KEY ATTRIBUTES FOR INDIVIDUAL LEARNING AND PERFORMANCE

ANNEX 1.1 Key Attributes for Individual Learning and Performance

	Attributes	**Key References**
1	Technical skill	Abdolmohammed, 1991; Ardichvill, 2003; Cheng, *et al*., 2007; Eraut, 2004; Goleman, 1998; Illeris, 2003; Lucas, *et al*., 2012; Moore, *et al*., 2002; Robles, 1991;Tabassi, *et al*., 2011
2	Knowledge	Abdolmohammed, 1991; Ardichvill, 2003; Cheng, *et al*., 2007; Eraut, 2004; Goleman, 1998; Illeris, 2003; Lucas, *et al*., 2012; Moore, *et al*., 2002; Tabassi, *et al*., 2011
3	Intellect	Eraut, 2004; Illeris, 2003
4	Motivation	Eraut, 2004; Goleman, 1998; Illeris, 2003; Moore, *et al*., 2002
5	Creativity	Cheng, *et al*., 2007; Eraut, 2004; Goleman, 1998; Illeris, 2003; Lucas, *et al*., 2012;
6	Social skills	Abdolmohammed, 1991; Eraut, 2004; Goleman, 1998; Illeris, 2003; Robles, 1991
7	Openness	Illeris, 2003
8	Integrity	Goleman, 1998; Illeris, 2003; Lucas, *et al*., 2012; Robles, 1991;
9	Responsibility	Abdolmohammed, 1991; Cheng, *et al*., 2007; 1998; Illeris, 2003; Robles (1991)
10	Reliability	Goleman, 1998; Illeris, 2003
11	Communication skills	Abdolmohammed, 1991; Ardichvill, 2003; Cheng, *et al*., 2007; Eraut, 2004; Goleman, 1998; Illeris, 2003; Lucas, *et al*., 2012; Moore, *et al*., 2002; Tabassi, *et al*., 2011

ANNEX 1.1 Key Attributes for Individual Performance and Learning (cont'd)

	Attributes	Key References
12	Business like attitude	Ardichvill, 2003; Lucas, *et al*., 2012; Robles, 1991
13	Numeracy skill	Lucas *et al*., 2012
14	Literacy skill	Lucas *et al*., 2012
15	Craftsmanship	Cheng, *et al*., 2007; Eraut, 2004; Goleman, 1998; Lucas, *et al*., 2012; Tabassi, *et al*., 2011
16	Ability to use tools and equipment	Lucas *et al*. 2012
17	Resourcefulness	Cheng, *et al*., 2007;Goleman, 1998; Illeris, 2003; Lucas, *et al*., 2012; Tabassi, *et al*., 2011
18	Multi-skills	Eraut, 2004
19	Meta-skills (learning skills)	Ardichvill, 2003; Eraut, 2004; Illeris, 2003; Lucas, *et al*., 2012
20	ICT skills	Lucas *et al*., 2012
21	Knowledge of materials	Lucas *et al*., 2012
22	Perception	Abdolmohammed, 1991; Eraut, 2004; Illeris, 2003; Tabassi, *et al*., 2011
23	Individuality	Illeris, 2003; Goleman, 1998
24	Innovative skills	Lucas *et al*., 2012; Goleman, 1998
25	Self-control	Eraut, 2004; Illeris, 2003; Goleman, 1998
26	Service Orientation	Ardichvill, 2003; Goleman, 1998

ANNEX 1.2 WORKPLACE LEARNING METHODS

Workplace learning methods	**Key References**
Project work	Cunningham *et al.* (2013);
Self-directed learning	Ley *et al.* (2008)
Coaching	Cullen *et al*, 2002, Cunningham *et al.*, 2013; Eraut, 2004; Harrison, 2009; Lucas *et al.*, 2012; Zhang, *et al.*
Mentoring	Cullen *et al.*, 2002, Cunningham *et al.*, (2013); Eraut, 2004; Fayek *et al*., 2006; Harrison, 2009; Lucas *et al.*, 2012; Zhang, *et al.* (2013)
Peer mentoring	Vaughan, 2008; Cunningham *et al.* (2013);
On site group training	Cunningham *et al.* (2013);
Developmental job rotation, cross training, stretch assignments	Cunningham *et al.* (2013);
Practicing and refining skill	Cullen, 2002; Eraut, 2004; Lucas *et al*., 2012; Vaughan, 2008;
Listening	Eraut, 2004; Lucas *et al.*, 2002
Drawing and sketching	Lucas *et al*. 2012
Watching and observing	Cullen, 2002; Eraut, 2004; Lucas *et al*., 2012
Reflection	Cullen, 2002; Eraut, 2004; Lucas *et al*., 2012; Vaughan, 2008;
Problem solving	Cullen, 2002; Davey *et al.,* 2004; Eraut, 2004; Lucas *et al*., 2012
Inquiry/asking questions	Cullen, 2002; Eraut, 2004; Lucas *et al*., 2012
Feedback (giving and receiving)	Cullen (2002); Eraut (2004); Lucas *et al*. (2012); Vaughan (2008);
Learning by trial and error	Eraut (2004); Lucas *et al.* (2012)
Demonstration	Cullen (2002); Lucas *et al*., 2012; Vaughan (2008);
Role modelling	Bowes (2008); Hall and Sanderlands (2009); Ley *et al.*, (2008); WEF (2016)

ANNEX 1.3 WORKFORCE LEARNING AND DEVELOPMENT PRACTICE

WORKFORCE PRACTICES	**KEY REFERENCES**
Strategic workforce planning	Bower (2008); Cooper and Wood (2012); Cunningham and Hillier (2013); Harrison (2009); DeTuncq and Schmidt (2013); Sambartolo (2015); WEF (2016); Raiden and Sempik (2012)
Acquiring the right talent	Blackburn *et al.* (2013); Harrison (2009); DeTuncq and Schmidt (2013); Horwitz (20130; Sambartolo (2015);
Workforce practices	Harrison (2009); Horwitz (2013); Sambartolo (2015); Oyegoke (2009)
Job-pairing/ job sharing	Eraut and Hirsh ((2007); Sambartolo (2015); WEF (2017); Smith *et al.* (2007)
Real time metrics on labour data	APC (2003); Sambartolo (2015); Giesecke and McNeil (2004); Raiden and Sempik (2012)
Individual variables	Eraut and Hirsh ((2007); Harrison (2009); Sambartolo (2015); Smith *et al.* (2004)
Automation of labour data collection and analysis	Harrison (2009); Sambartolo (2015)
Labour learning and development costs	Bryson *et al.* (2005); Eraut and Hirsh ((2007); Harrison (2009); Oyegoke, *et al.* (2009); Sambartolo (2015); (Wang, *et al.,* 2010)
Executive Commitment to learning and development	Australian Public Service Commission (APS) (2003); Harrison (2009); Sambartolo (2015); (Stiles and Kulvisaechana, 2003);
Performance alignment with business objectives	Abdel-Wahab, *et al.* (2008); Van Riel (2008); Harrison (2009); Hodges DeTuncq and Schmidt (2013); Marquardt (2011); Vaughan (2008)
Employee participation	Bryson *et al.* (2005); Eraut and Hirsh ((2007); Harrison (2009); Marquardt 92011); Rogers *et al.* (2012); Van Riel (2008

ANNEX 1.3 WLD Practices (cont'd)

WORKFORCE PRACTICES	KEY REFERENCES
Communication	Chinowsky and Carrillo (2007); Eraut and Hirsh ((2007); Giesecke and McNeil (2004); Marquardt (2011); Moorby (1996); Van Riel (2008);
Involvement in decision making	Eraut and Hirsh ((2007); Harrison (2008); Van Riel (2008)
Cross division dialogue	Harrison (2008); Van Riel (2008)
Make information accessible to all	Chinowski and Carrillo (2007); Giesecke and McNeil, (2004); Harrison (2008); Van Riel (2008)
Increase line of sight, visibility across units	Harrison (2008); Harrison (2008); Harrison (2008); Sambartolo (2015); Van Riel (2008)
Provide feedback on employee contribution to achieving business goals	Harrison (2008); Van Riel (2008)
Provide recognition for contribution to business goals	Druker (2012); Harrison (2008); Van Riel (2008)
Capability development program	Eraut and Hirsh ((2007); Harrison (2009); Ley *et al.* (2008); Van Riel (2008)
Provide employees with sufficient resources to pursue goals	Harrison (2008); Van Riel (2008)
Provide employees with sufficient training to pursue goals	Harrison (2008); Van Riel (2008)
Provide employees with sufficient authority to pursue goals	Harrison (2008); Van Riel (2008)
Individuals take personal responsibility	Eraut (2004); Eraut and Hirsh ((2007); Bowes (2008); Harrison (2008)
Opportunities for formal learning	Bowes (2008); Eraut and Hirsh ((2007); Harrison (2008); Manuti *et al.* (2015); WEF (2016)

ANNEX 1.3 WLD Practices (cont'd)

WORKFORCE PRACTICES	**KEY REFERENCES**
Custom design learning to specifically address identified need	Bowes (2008); Harrison (2008);
Apply a variety of activities, in-house and external	Bowes (2008); Eraut and Hirsh ((2007); Manuti *et al.* (2015); Marquardt (2011); Siemens (2004); Steffens (2015); WEF (2016);
Reward and recognise participants' success	Bowes (2008); (Giesecke and McNeil, 2004)
Increase self-esteem	Bowes (2008) (Giesecke and McNeil, 2004)
Create increased value for in-house development programme	Bowes (2008); Tabassi *et al.* (2011)
Seek credit from local educational institutions	Bowes (2008); Harrison (2009)
Partner with local educational institutions for certification	Bowes (2008); Harrison (2009)
Provide informal learning opportunities	Bowes (2008); Horwitz (2013); John *et al.* (2016); Manuti *et al.* (206);
Provide full-time or part-time temporary assignments	Bowes (2008); Manuti (2015); Zemke (1985)
Allow participation in special projects	Bowes (2008); Harrison (2009)
Train internal trainers, mentors and coaches	Bowes (2008); Harrison (2009)
Establish line management responsibility for learning and development of subordinates	Eraut and Hirsh ((2007); Castledine and Renwick (2013); Cullen *et al.* (2002); Grugulis (2003)

Table A1.2 WLD Practices (cont'd)

WORKFORCE PRACTICES	**KEY REFERENCES**
Provide overall training consistency	Bowes (2008); Eraut and Hirsh ((2007); Harrison (2009)
Formalise employee mentoring	Bowes (2008); Manuti *et al.* (2015); WEF (2016)
Individual development plan	Eraut and Hirsh ((2007); Marquardt (2011); Bowes (2008)
Create dual career track	Bowes (2008)
Career management and career development	Ahmad *et al.* (2015); Blackburn *et al.,* 2013; Bowes (2008); Hall and Sanderlands (2009); Kikwasi (2011); Kyriakidou *et al*. (2013);
Align career progression with business objectives	APS (2003); Bowes (2008)
Performance management	APS (2003); Harrison (2009); DeTuncq and Schmidt (2013); Kyriakidou *et al.,* (2013);
Succession management	DeTuncq and Schmidt (2013)
Executive development	APS (2003); Harrison (2009); DeTuncq and Schmidt (2013)
	APS (2003); Harrison (2009); DeTuncq and Raiden and Sempik (2012); Schmidt (2013)
Executive coaching	Harrison (2009); DeTuncq and Schmidt (2013)
Job rotation	DeTuncq and Schmidt (2013); WEF (2016)
Employee engagement	Harrison (2009); DeTuncq and Schmidt (2013)
Reward and motivate individuals	Druker (2012); DeTuncq and Schmidt (2013)
Establish baselines	Druker (2012); DeTuncq and Schmidt (2013)
Performance evaluation	Druker (2012); Harrison (2009); DeTuncq and Schmidt (2013)
Compensation and reward systems	Druker (2012); DeTuncq and Schmidt (2013); Horwitz (2013);

Table A1.2 WLD Practices (cont'd)

WORKFORCE PRACTICES	**KEY REFERENCES**
Learning environment	Eraut (2004); Carrim and Basson (2013); Dankbaar (1999);
Develop workgroups/teams to balance skill sets	Harrison (2009); Meade and Iles (2013); Rogers *et al.* (2012); Sambartolo (2015); WEF (2016)
Develop a learning culture	Carrim and Basson 92013); Ghoshal and Bartlett (1994); Harrison (2009); DeTuncq and Schmidt (2013); Horwitz (2013); Marquardt (2011); Rogers *et al.* (2012)
Provide learning resources	Du Plessis *et al.* (1999); Ley *et al.* (2008); Marquardt (2011); Vaughan (2008);
Knowledge management	Egbu *et al.* (2003); Gold (2013); Harrison (2009); Giesecke and McNeil (2004); Chinowski and Carrillo (2007)
Diffusion of technology	Hall and Sanderlands (2009); WEF (2016)
Allow flexible employment practices	Horwitz (2013); Raiden and Sempik (2012)
Re-employing retired highly skilled and experienced people in training, mentoring and coaching roles	Eraut and Hirsh ((2007); Horwitz (2013); WEF (2016)
Ensuring employment equity	Horwitz (2013); Harrison (2009)
Exploit technology for learning	WEF (2016)
Management capability and responsibility to support learning	Eraut and Hirsh ((2007); Giesecke and McNeil (2004), Chinowski and Carrillo (2007)
Structured approach to learning	Eraut and Hirsh ((2007); Zemke (1985)
Developing communities of practice	Harrison (2009); Tennat (2001); Wenger (2009); Wenger *et al.* (2002)

ANNEX 1.2 WLD Practices (cont'd)

WORKFORCE PRACTICES	**KEY REFERENCES**
Integration	Harrison (2009); Marquardt (2011); Vaidyanathan and Howell (2007)
No blame culture	Harrison (2009); WEF (2016)
Managing learning and innovation	Harrison (2009); WEF (2016)
Whole person approach to learning	Billet (2004); Goleman (1998); Illeris (2007); Jarvis *et al.* (2003); Jarvis and Parker, (2007); Hoover *et al.* (2010); Poortman *et al.* (2011)
Learning part of everyday work	Harrison (2009)

APPENDIX II PRELIMINARY EXPLORATORY STUDIES

ANNEX 2.1 SURVEY INVITATION

University of Central Lancashire

Professor Akintola Akintoye
BSc(Hons) MSc PhD FRICS FCIOB FinstCM
Dean of School
Grenfell-Baines School of Architecture,
Construction and Environment
University of Central Lancashire
Preston PR1 2HE
Telephone 01772 893210
Fax 01772 892916
Email AAkintoye@uclan.ac.uk
www.uclan.ac.uk

January 2014

EVALUATING THE ADEQUACY AND EFFICIENCY OF CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEMS IN NIGERIA

We are carrying out a research project aimed at ***developing a skills training model that enables construction firms to optimise performance by integrating various effective training approaches into existing business models***. You have been identified as a domain expert in the Nigerian construction industry and we are therefore inviting you to participate in this research study by completing the attached questionnaire.

The questionnaire will require approximately 30 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please do not include your name. All data collected will be held securely and will be kept confidential. Only people with a legitimate academic need will see your actual completed questionnaire. If you choose to participate in this study, please answer all questions as honestly as possible and return the completed questionnaires promptly. Participation is strictly voluntary and you may withdraw from participating up to one month after returning the completed questionnaire.

The data collected will provide useful information regarding the development of vital human resource for the Nigerian construction industry. Please go through the attached information sheet carefully before completing the questionnaire. Completion and return of the questionnaire will indicate your consent to participate in this study. If you require additional information or have questions, please contact us at the email address listed below.

Yours sincerely,

Gloria Ene guene@uclan.ac.uk
Professor J. S. Goulding
Dr. Godfaurd John

University of Central Lancashire

PARTICIPANT INFORMATION SHEET

Study Title
AN EVALUATION OF THE ADEQUACY AND EFFICIENCY OF THE CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEM IN NIGERIA

You are being invited to take part in a research study with the above title. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully.

Purpose of the study
Construction firms are the primary beneficiaries of construction skills and construction sites are the primary location for construction skills education and training. There is a need for an education and training system that is effective and efficient which also fits into the construction firm's business strategy. The study is therefore aimed at developing a construction skills training model that will enable construction firms optimise performance by integrating various effective learning approaches into existing business models.

Participation in the study
Why have I been approached?
You have been identified as a domain expert in the Nigerian construction industry and are therefore among a select group of 500 experts who have been asked to participate in this pioneering research. There is no compensation for taking part in the study and there is no known risk involved.

What will this study involve?
This study involves completion of a questionnaire (please find attached) which should take no more than 30 minutes to complete. The questionnaire contains questions relating to the knowledge, skills, abilities, education and training provided to construction workers. Once the questionnaire has been completed, this should be returned to guene@uclan.ac.uk. Please answer all questions as honestly as possible and return the completed questionnaire promptly to reach the researcher within two weeks.

Do I have to take part?
No. It is up to you to decide whether or not to take part. Participation is entirely voluntary. Your completing of the attached questionnaire will imply that you have consented to take part in the study. If you do decide to take part you are still free to withdraw up to one month after returning the questionnaire without giving a reason. In that case your completed questionnaire will be deleted from the study. If, however, your completed questionnaire is anonymised at the time of collection (i.e. there is no way to link you with the questionnaire you completed) withdrawal will not be possible.

Benefits
The data collected will provide useful information regarding the development of vital human resource for the Nigerian construction industry.

Confidentiality
In order to ensure that all information will remain confidential, please do not include your name. Any information you provide as part of this research will be used purely for academic purposes only and will be treated with the utmost confidentiality to meet with the requirements of the Data Protection Act 1998 (DPA) of the United Kingdom. Only people with a legitimate academic need will see your actual completed questionnaire.

Confidentiality, privacy and anonymity will be ensured in the collection, storage and publication of research material by anonymising all personal data collected, storing data electronically in encrypted files on the University of Central Lancashire secure network and transferring data electronically in encrypted files using encrypted drives where necessary. All personal data will be anonymised in the publication of research findings.

Data generated by this study will be kept securely in paper and electronic form for five years from the end of the project after which it will be destroyed through the University's secure disposal systems.

Results of research study
The results of this study will be used in the researcher's PhD Thesis and will also be used in journal paper publications and presented at conferences.

Reviews
This research study has been approved by the University of Central Lancashire Research Ethics Committee

Contact
For further information or clarification:
Gloria Ene
guene@uclan.ac.uk
+44 7554841824

Supervisory Team:
Professor J.S. Goulding JSGoulding@uclan.ac.uk.
Dr Godfaurd John GAJohn@uclan.ac.uk

If you have any concerns about the manner in which the research has been conducted please contact:

Dean of School
Professor Akintola Akintoye
Grenfell-Baines School of Architecture, Construction and Environment
University of Central Lancashire
Preston PR1 2HE
United Kingdom
Email: AAkintoye@uclan.ac.uk
Telephone: 01772 893210
Fax: 01772 892916

Thank you for taking time to read this information sheet.
January 8, 2014

ANNEX 2.2 QUESTIONNAIRE A : INDIVIDUAL WORKER LEARNER STUDIES

AN EVALUATION OF THE ADEQUACY AND EFFICIENCY OF THE CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEM IN NIGERIA

QUESTIONNAIRE A

The objective of this questionnaire is to determine:

- The construction environment in Nigeria with respect to characteristics of organisations and the supply systems for construction skilled workers
- The individual attributes (desired learning outcomes) that determine performance of construction skilled workers
- The effectiveness of the learning approaches applicable to construction skilled workers
- The appropriate criteria for measuring the performance of construction skilled workers

Definition:

For the purpose of this study construction intermediate skilled workers are craftsmen, plant and equipment operators and site supervisors

CONSTRUCTION ENVIRONMENT

1. Please indicate your area of expertise in the construction industry. Please tick **one box only**.

☐ Construction manager
☐ Architect
☐ Builder
☐ Civil Engineer
☐ Quantity Surveyor
☐ Site supervisor
☐ Educator/Trainer
☐ Other (Please specify)

2. How long have you been involved in the construction industry?

☐ 0-5 years
☐ 6 -10 years
☐ 11 -15 years
☐ 16 - 20 years
☐ 21-25 years
☐ Over 25 years

Please indicate how much you agree or disagree with the following statements. State whether you strongly agree (SA), agree (A), disagree (D) or strongly disagree (SD).

3. Construction firms in Nigeria employ greater use of technology in carrying out construction activities relative to other sectors in the Nigerian economy e.g. manufacturing, oil and gas

SA ☐ A ☐ D ☐ SD ☐

4. Construction workers in Nigeria are multi-skilled (possess more than one construction skill)

SA ☐ A ☐ D ☐ SD ☐

5. Construction workers are involved in a wide variety of activities on sites involving more than one skill

SA ☐ A ☐ D ☐ SD ☐

6. Construction site workers in Nigeria work with little supervision

SA ☐ A ☐ D ☐ SD ☐

7. Construction workers in Nigeria exercise authority in making decisions within their specific area of activity on project sites

SA ☐ A ☐ D ☐ SD ☐

8. Construction workers in Nigeria exhibit great responsibility for the quality of their work on project sites

SA ☐ A ☐ D ☐ SD ☐

9. There is no requirement for middle level management on construction sites in Nigeria

SA ☐ A ☐ D ☐ SD ☐

10. There is strict division of labour on construction sites in Nigeria with each worker assigned to specific tasks

SA ☐ A ☐ D ☐ SD ☐

11. How much direct experience have you had with construction site workers in Nigeria?

☐ None
☐ Limited
☐ Moderate
☐ Considerable
☐ Extensive

Indicate the frequency with which you have come across construction site workers trained under each of the following systems. State whether always (AL), usually US), sometimes (S), rarely (R) or never (N)

12. Trade school in Nigeria with trade certification

AL ☐ US ☐ S ☐ R ☐ N ☐

13. Technical college with National Business and Technical Examination Board (NABTEB) qualification

AL ☐ US ☐ S ☐ R ☐ N ☐

14. Polytechnic in Nigeria with National Diploma (ND)

AL ☐ US ☐ S ☐ R ☐ N ☐

15. Tertiary education in Nigeria with Higher National Diploma (HND) or higher degree

AL ☐ US ☐ S ☐ R ☐ N ☐

16. Formal apprenticeship programme with certification

AL ☐ US ☐ S ☐ R ☐ N ☐

17. Informal apprenticeship without certification

AL ☐ US ☐ S ☐ R ☐ N ☐

18. Formal on-the-job training within a construction firm

AL ☐ US ☐ S ☐ R ☐ N ☐

19. Formal craft training in a foreign country e.g. Togo, Ghana, Benin Republic, UK, USA, and.

AL ☐ US ☐ S ☐ R ☐ N ☐

20. National Board for Technical Education (NBTE) approved Enterprise with ND

AL ☐ US ☐ S ☐ R ☐ N ☐

21. National Open Apprenticeship Scheme of the National Directorate of Employment

AL ☐ US ☐ S ☐ R ☐ N ☐

22. Please score each of the training providers in Table 1 in terms of their ability to deliver high quality construction skills on a scale of 1 (very poor quality construction skilled workers) to 10 (excellent construction skilled workers)

TABLE 1: Training Provision

TRAINING PROVIDERS	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Trade school in Nigeria										
Technical College in Nigeria										
Polytechnic with ND										
Tertiary Institution with HND and above										
Formal apprenticeship scheme										
Informal apprenticeship scheme										
Formal training within contractor organisation										
Formal craft training outside Nigeria										
Enterprise Institutions										
National Open Apprenticeship Scheme										

INDIVIDUAL ATTRIBUTES (LEARNING OUTCOMES) FOR PERFORMANCE

Section 1: Prime Example of Construction Skilled Worker You Have Known

Table 2 lists the **attributes** that literature suggests that an individual skilled worker needs to perform excellently.

This section of the questionnaire requires 4 steps to complete it:

Step 1: Please think about one construction skilled worker that you have had direct experience with that you would consider their performance excellent.

Step 2: In Table 2, circle 10 attributes only that your prime example possesses that in your opinion has contributed to their high level of performance

Step 3 Rank them in order of importance from the most important (1) to the least important (10)

Step 4:Rate each of the selected attributes in terms of their weighting in contributing to performance by placing a tick (√) in the appropriate cell

23. TABLE 2: Attributes for Performance

Rank	Attribute	Very Important	Important	Of average Importance	Of little importance	Of no importance
	Technical skill					
	Underpinning knowledge/theory of skill					
	Intellect					
	Perception					
	Creativity					
	Responsibility					
	Reliability					
	Individuality					
	Self-control					
	Service-orientation					
	Motivation					
	Openness					
	Social skills					
	Communication skills					
	ICT skills					
	Craftsmanship or pride in work					
	Resourcefulness					
	Numeracy skills					
	Literacy skills					
	Business-like attitude					
	Integrity					
	Use of a range of tools and equipment					
	Knowledge of materials					
	Multi-skilled (Has more than one skill)					
	Meta-skills e.g. ability to learn, reflection					
	Innovative					
	Emotional intelligence					
	Other (please specify)					

Section 2: Worst Example of Construction Skilled Worker You Have Known

Table 3 lists the **negative attributes** that literature suggests may contribute to poor performance of construction skilled workers:

This section of the questionnaire requires 4 steps to complete it:

Step 1: Please think about one construction skilled worker that you have had direct experience with that you would consider their performance the worst you have ever come across

Step 2: In Table 3, circle 10 **negative attributes** only that your worst example possesses that in your opinion has contributed to their poor performance

Step 3: Rank the selected **negative attributes** in order of level of contribution to poor performance from highest contributor (1) to lowest contributor (10).

Step 4: Rate each of the selected **negative attributes** in terms of their weighting in contributing to very poor performance by placing a cross (X) in the appropriate cell

24. TABLE 3: Negative Attributes

Rank	Negative Attribute	Very significant	Significant	Of average significance	Of little significance	Of no significance
	Inept or incompetent in skill					
	Physical (Little or no underpinning knowledge/theory of skill)					
	Ignorant					
	Unobservant					
	Unimaginative					
	Immature					
	Unreliable					
	Insecure					
	Undisciplined					
	Ill mannered					
	Lacking in initiative					
	Closed minded					
	Aggressive					
	Poor communication skills					
	Poor ICT skills					
	Poor craftsmanship (takes no pride in work)					
	Poor numeracy skills					
	Poor literacy skills					
	Un-enterprising					
	Dishonest					
	Limited in knowledge and use of tools and equipment					
	Poor material sense					
	Narrow skilled					
	Poor meta-skills					
	Not innovative					
	Low emotional intelligence					
	Other (please specify)					

Section 3: Ideal Construction Worker

Step 1: Picture the ideal construction worker of the 21st century aged between 19 and 25 years and think about the attributes you think they should possess.

Step 2: In Table 4, circle 10 attributes only that your ideal worker needs for a high level of performance

Step 3 Rank them in order of importance from the most important (1) to the least important (10)

Step 4: Rate each of the selected attributes in terms of their weight in contributing to performance by placing a tick (√) in the appropriate cell

25. TABLE 4: Ideal Worker Attributes

Rank	Attribute	Very significant	Significant	Of average Significance	Of little Significance	Of no Significance
	Technical skill					
	Knowledge					
	Intellect					
	Perception					
	Emotional intelligence					
	Creativity					
	Responsibility					
	Reliability					
	Individuality					
	Self-control					
	Service-orientation					
	Motivation					
	Openness					
	Social skills					
	Communication skills					
	ICT skills					
	Craftsmanship					
	Resourcefulness					
	Numeracy skills					
	Literacy skills					
	Business-like attitude					
	Integrity					
	Technology					
	Materials					
	Multi-skills					
	Meta-skills					
	Other (please specify)					

EFFECTIVE LEARNING APPROACHES

26. Have you ever received formal or informal training in a construction skill

☐ Yes

☐ No

If No, skip Section 4 and go to Section 5

Section 4

27. Please describe your best learning experience during your formal or informal training in a construction skill by rating each of the following as strongly agree (SA); agree (A); disagree (D); and strongly disagree (SD):

TABLE 5: Effective Learning Approaches

S/No	Item description	SA	A	D	SD
i.	I had the necessary prerequisite basic knowledge for the skill being taught				
ii.	I had a strong initial desire to learn the skill				
iii.	I needed to learn the skill quickly so I could start earning money from it				
iv.	I enjoy learning new things				
v.	I was under 16 years of age				
vi.	I was between 16 and 25 years of age				
vii.	I was over 25 years of age				
viii.	I enjoy working with my hands				
ix.	I was the only person being trained at the time				
x.	I had little interest in learning at first but developed interest during training				
xi.	There were less than five of us being trained at the same time				
xii.	There were between five and ten of us being trained at the same time				
xiii.	There were between 10 and 20 of us being trained at the same time				
xiv.	There were more than 20 of us being trained at the same time				
xv.	My trainer was very proficient in the skill he was teaching me (us)				
xvi.	My trainer had a lot of background knowledge of the skill he was teaching				
xvii.	My trainer was willing to answer all my questions				
xviii.	My trainer obviously enjoyed what he was teaching				
xix.	My trainer inspired me to learn the skill by his attitude				
xx.	My trainer had little or no teaching experience				
xxi.	My trainer had little interest in our learning the skill				
xxii.	My trainer liked to show off his skill and knowledge				
xxiii.	My trainer belittled me in my lack of knowledge of the skill				

TABLE 5: Effective Learning Approaches (cont'd)

S/No	Item description	SA	A	D	SD
xxiv.	The training took place in a classroom				
xxv.	The training took place in a workshop				
xxvi.	The training took place in classroom and workshop combined				
xxvii.	The training took place on a busy construction site				
xxviii.	The training took place on a slow construction site				
xxix.	The training took place in classroom and site combined				
xxx.	I was taught the theory underpinning the skill I was learning				
xxxi.	The trainer used many pictures, diagrams and sketches				
xxxii.	We were required to do a lot of sketching and drawing during training				
xxxiii.	The training involved learning how to estimate quantity of materials required				
xxxiv.	The training involved doing some of the work myself				
xxxv.	The training involved me watching the trainer do the work				
xxxvi.	The trainer gave us work to do and came back later to discuss our performance				
xxxvii.	The trainer gave us real life problems to solve				
xxviii.	The atmosphere at the construction site was friendly				
xxxix.	Other skilled workers on the site were friendly and encouraging				
xl.	I understood the language and 'jargon' of the construction site				
xli.	There were enough tools and equipment to carry out the learning tasks				
xlii.	I learnt a lot in a very short time				
xliii.	My training lasted three years				
xliv.	My training lasted two years				
xlv.	My training lasted one year				
xlvi.	My training lasted less than one year				
xlvii.	I enjoyed the methods used by the trainer in teaching me the skills				
xlviii.	I had no specific trainer				
xlix.	I learned by just copying what others were doing				
l.	I learned by doing and by trial and error				
li.	I passed a formal test at the end of my training				
lii.	I was awarded a certificate at the end of my training				
liii.	I was confident that I could perform the skill without guidance by the end of my training				
liv.	I have great pride in performing my skill excellently				
lv.	I earn a living from the construction skill(s) that I possess				

Section 5

28. Evaluate the following teaching methods for effectiveness in the learning of construction skills by:

Step 1: In Table 6, circle 10 teaching methods that you consider effective in the teaching of construction skills

Step 2: Rank them in order of importance from the most effective (1) to the least effective (10)

Step 3: Rate each of the selected teaching methods for effectiveness on a scale of 1 (effective) to 5 (very effective) by placing a tick (√) in the appropriate cell

TABLE 6: EFFECTIVE TEACHING METHODS

Rank	Teaching Methods	Effective 1	2	3	4	Very Effective 5
	Learning by watching					
	Learning by imitation					
	Learning by practicing (trial and error)					
	Learning through feedback					
	Learning through conversation					
	Learning by teaching and helping					
	Learning by real world problem solving					
	Learning through enquiry					
	Learning by thinking critically and producing knowledge					
	Learning by listening, transcribing and remembering					
	Learning by drafting and sketching					
	Learning by reflection					
	Learning on the fly					
	Learning by being coached					
	Learning by competing					
	Learning through virtual environments					
	Learning through simulation and role play					
	Learning through games					
	Others (please specify)					

PERFORMANCE CRITERIA

Step 1: In Table 7, circle ten criteria that you consider most appropriate in evaluating performance of construction skilled workers

Step 2: Rank the selected in order of appropriateness in evaluating performance of construction skilled workers from the most appropriate (1) to the least appropriate (10)

Step 2: Rate each of the criteria in terms of their importance in evaluating performance of construction skilled workers by placing a tick (√) in the appropriate cell

29. TABLE 7: Ranking and Rating of Performance Criteria

Rank	Performance Criteria	Very Important	Important	Of average Importance	Of little importance	Of no importance
	Quantity of work completed in a day					
	Quality of output					
	Efficient use of time					
	Efficient use of materials					
	Efficient use of tools and equipment					
	Ability to work under pressure					
	Additional responsibilities e.g. supervision, mentoring, coaching,					
	Attitude/Behaviour					
	Punctuality					
	Absenteeism					
	Payment band					
	Teamwork					
	Other (please specify)					

DEMOGRAPHICS

30. Please indicate the geographical area in Nigeria where you have been involved in construction activity. You may tick **more than one** box if applicable.

☐ South-West Nigeria
☐ South-East Nigeria
☐ South-South Nigeria
☐ North-West Nigeria
☐ North-Central Nigeria
☐ North-East Nigeria

31. Please state gender

☐ Female Male ☐

32. Age

☐ Below 30 years
☐ 1 – 40 years
☐ 1 – 50 years
☐ 1 – 60 years
☐)ver 60 years

THANK YOU FOR YOUR TIME

APPENDIX I - DEFINITION OF TERMS

List 1: These are the **attributes** from literature for an individual skilled worker needs to perform excellently.

A – Technical skill: Ability to perform the skill they profess with expertise

B – Knowledge: Understanding the underpinning knowledge/theory of the skill they profess

C – Intellect: Ability to think rationally, systematically, analytically and critically

D – Perception: Ability to observe and interpret, to see beyond the obvious

E – Creativity: Ability to innovate and come up with novel ways of carrying out routine tasks

F – Responsibility: Commitment to getting the work done

G – Reliability: Not requiring close marking, requiring little supervision

H – Individuality: Independent and possessing self-confidence, not easily influenced by peers

I – Self-control: Ability to concentrate on the task

J – Service orientation: A disposition to be helpful, considerate and cooperative

K – Motivation: Possesses inner drive to achieve results

L – Openness: Is open to new ideas and new knowledge, has a keenness to learn

M – Social skills: Ability to interact easily with others, works well in team situations

N – Communication: Is able to communicate in various forms, verbally, in writing, with drawings

O – ICT skills: Ability to use computers and the internet to communicate, perform basic tasks and to find information when required

P – Craftsmanship: Takes pride in work and in doing it excellently

Q – Resourcefulness: Ability to deal with non-routine situations

R – Numeracy skills: Ability to carry out simple mathematical calculations, to estimate quantities and cost of material and labour requirements correctly

S – Literacy skills: Ability to read written communications and to read and understand architectural and structural drawings

T – Business-like attitude: Possessing entrepreneurial skills and attitudes

U – Integrity: Possessing the quality of being honest and having strong moral principles

V – Technology: Knowledge and understanding of a wide range of appropriate tools and equipment and ability to select appropriately for each task

W – Materials: A sensibility to the properties, behaviour and affordances of the wide range of materials required for given tasks

X – Multi-skilled: Possesses more than one skill and can multitask on construction sites interfacing seamlessly with skills and wok packages

Y – Meta skills: Possessing the wider skills for personal growth and development such as ability to learn, to innovate, reflection

Z – Emotional intelligence: Ability to perceive, use, understand and manage ones emotions, that of others and of groups

List 2: This is the list of **negative attributes** that literature suggests may contribute to poor performance of construction skilled workers:

A – Ineptitude: Inability to perform the skill they profess with expertise

B – Physical: Possesses specific skills with little or no underpinning knowledge/theory of the skill they profess

C – Ignorant: Unable to think rationally, systematically, analytically and critically

D – Unobservant: Unable to pick up perceive things that are of significance in the immediate environment

E – Unimaginative: Incapable of original thought, cannot think or act beyond the routine

F – Immaturity: Unable to take on responsibility or authority for work

G – Unreliability: Cannot be relied on to carry out given tasks, requires close supervision

H – Insecure: Lacks self-confidence, cannot make decisions, is easily influenced by peers

I – Indiscipline: Unable to work within specified rules and regulations

J – Ill mannered: Discourteous, unhelpful and uncooperative

K – Lacking in initiative: Not dynamic, needs to be pushed to perform

L – Closed minded: Unable to accept new ideas, methods or learning

M – Aggressive: Has poor interpersonal skills

N – Poor communication skills: Is unable to communicate in various forms, verbally, in writing, with drawings

O – Poor ICT skills: Unable to use computers and the internet to communicate, perform basic tasks and to find information when required

P – Poor craftsmanship: Takes no pride in work and in doing it excellently

Q – Poor numeracy skills: Unable to carry out simple mathematical calculations, to estimate quantities and cost of material and labour requirements correctly

S – Poor literacy skills: Unable to read written communications and to read and understand architectural and structural drawings

T – Un-enterprising: Does not see their skill as something to be developed and grown in a business-like manner

U – Dishonest: Fraudulent and lacking in principles

V – Poor technological skills: Limited in knowledge and use of appropriate tools and equipment

W – Poor material sense: Poor knowledge and understanding of the wide range of materials required for given tasks

X – Narrow-skilled: Possesses only one skill and finds it difficult to operate outside of specific competencies

Y – Poor meta-skills: Lacks the wider skills for personal growth and development such as ability to learn, to innovate, reflection

ANNEX 2.3 QUESTIONNAIRE B: CONSTRUCTION ORGANISATION LEARNING ENVIRONMENT STUDIES

University of Central Lancashire

Professor Akintola Akintoye
BSc(Hons) MSc PhD FRICS FCIOB FinstCM
Dean of School
Grenfell-Baines School of Architecture,
Construction and Environment
University of Central Lancashire
Preston PR1 2HE
Telephone 01772 893210
Fax 01772 892916
Email AAkintoye@uclan.ac.uk
www.uclan.ac.uk

January 2014

EVALUATING THE ADEQUACY AND EFFICIENCY OF CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEMS IN NIGERIA

We are carrying out a research project aimed at ***developing a skills training model that enables construction firms to optimise performance by integrating various effective training approaches into existing business models***. You have been identified as a domain expert in the Nigerian construction industry and we are therefore inviting you to participate in this research study by completing the attached questionnaire.

The questionnaire will require approximately 30 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please do not include your name. All data collected will be held securely and will be kept confidential. Only people with a legitimate academic need will see your actual completed questionnaire. If you choose to participate in this study, please answer all questions as honestly as possible and return the completed questionnaires promptly. Participation is strictly voluntary and you may withdraw from participating up to one month after returning the completed questionnaire.

The data collected will provide useful information regarding the development of vital human resource for the Nigerian construction industry. Please go through the attached information sheet carefully before completing the questionnaire. Completion and return of the questionnaire will indicate your consent to participate in this study. If you require additional information or have questions, please contact us at the email address listed below.

Yours sincerely,

Gloria Ene guene@uclan.ac.uk
Professor J. S. Goulding
Dr. Godfaurd John

INVESTOR IN PEOPLE

PARTICIPANT INFORMATION SHEET

Study Title
AN EVALUATION OF THE ADEQUACY AND EFFICIENCY OF THE CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEM IN NIGERIA

You are being invited to take part in a research study with the above title. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully.

Purpose of the study
Construction firms are the primary beneficiaries of construction skills and construction sites are the primary location for construction skills education and training. There is a need for an education and training system that is effective and efficient which also fits into the construction firm's business strategy. The study is therefore aimed at developing a construction skills training model that will enable construction firms optimise performance by integrating various effective learning approaches into existing business models.

Participation in the study
Why have I been approached?
You have been identified as a domain expert in the Nigerian construction industry and are therefore among a select group of 500 experts who have been asked to participate in this pioneering research. There is no compensation for taking part in the study and there is no known risk involved.

What will this study involve?
This study involves completion of a questionnaire (please find attached) which should take no more than 30 minutes to complete. The questionnaire contains questions relating to the knowledge, skills, abilities, education and training provided to construction workers. Once the questionnaire has been completed, this should be returned to guene@uclan.ac.uk. Please answer all questions as honestly as possible and return the completed questionnaire promptly to reach the researcher within two weeks.

Do I have to take part?
No. It is up to you to decide whether or not to take part. Participation is entirely voluntary. Your completing of the attached questionnaire will imply that you have consented to take part in the study. If you do decide to take part, you are still free to withdraw up to one month after returning the questionnaire without giving a reason. In that case your completed questionnaire will be deleted from the study. If, however, your completed questionnaire is anonymised at the time of collection (i.e. there is no way to link you with the questionnaire you completed) withdrawal will not be possible.

Benefits
The data collected will provide useful information regarding the development of vital human resource for the Nigerian construction industry.

Confidentiality
In order to ensure that all information will remain confidential, please do not include your name. Any information you provide as part of this research will be used purely for academic purposes only and will be treated with the utmost confidentiality to meet with the requirements of the Data Protection Act 1998 (DPA) of the United Kingdom. Only people with a legitimate academic need will see your actual completed questionnaire.

Confidentiality, privacy and anonymity will be ensured in the collection, storage and publication of research material by anonymising all personal data collected, storing data electronically in encrypted files on the University of Central Lancashire secure network and transferring data electronically in encrypted files using encrypted drives where necessary. All personal data will be anonymised in the publication of research findings.

Data generated by this study will be kept securely in paper and electronic form for five years from the end of the project after which it will be destroyed through the University's secure disposal systems.

Results of research study
The results of this study will be used in the researcher's PhD Thesis and will also be used in journal paper publications and presented at conferences.

Reviews
This research study has been approved by the University of Central Lancashire Research Ethics Committee

Contact
For further information or clarification:
Gloria Ene
guene@uclan.ac.uk
+44 7554841824

Supervisory Team:
Professor J.S. Goulding JSGoulding@uclan.ac.uk.
Dr Godfaurd John GAJohn@uclan.ac.uk

If you have any concerns about the manner in which the research has been conducted please contact:

Dean of School
Professor Akintola Akintoye
Grenfell-Baines School of Architecture, Construction and Environment
University of Central Lancashire
Preston PR1 2HE
United Kingdom
Email: AAkintoye@uclan.ac.uk
Telephone: 01772 893210 Fax: 01772 892916

Thank you for taking time to read this information sheet.
January 8, 2014

University of Central Lancashire

AN EVALUATION OF THE ADEQUACY AND EFFICIENCY OF THE CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEM IN NIGERIA

QUESTIONNAIRE B

Purpose

To determine the workforce practices that are significant for the success of workforce learning and development in construction firms in Nigeria

SECTION A GENERAL INFORMATION

1. Please indicate your highest level of academic qualification in a construction related discipline.

☐ PhD
☐ MSc
☐ BSc
☐ HND
☐ Other (Please specify)

2. How long have you been involved in the construction industry?

☐ 0-6 years
☐ 6 -10 years
☐ 11 -15 years
☐ 16 - 20 years
☐ 21-25 years
☐ Over 25 years

3. How long have you been working within construction organisations?

☐ 0-5 years
☐ 6 -10 years
☐ 11 -15 years
☐ 16 - 20 years
☐ 21-25 years
☐ Over 25 years

4. Please indicate the geographical area in Nigeria where you have been involved in construction activity. You may tick **more than one** box if applicable.

☐ South-West Nigeria
☐ South-East Nigeria
☐ South-South Nigeria
☐ North-West Nigeria
☐ North-East Nigeria
☐ North-Central Nigeria

SECTION B WORKFORCE PRACTICES

A generic list of generic workforce learning and development practices are provided below. Please, rate each of the attributes in terms of their weighting in contributing to performance by placing a tick (√) in the appropriate cell:

	WORKFORCE PRACTICES	Very important	Important	Of average importance	Of little importance
WP1	Strategic workforce planning				
WP2	Acquiring the right talent				
WP3	HR strategies and practice, staffing, compensation and performance management				
WP4	Use job-pairing of less experience with more experienced to increase capacity				
WP5	Generating real time metrics on labour data and using this to make projections and set targets				
WP6	Develop individual attributes for effective learning, employees learn how to learn				
WP7	Manage innovation				
WP8	Automate labour data collection and analysis				
WP9	Manage labour learning and development costs				

WP10	Establish a culture of no blame for genuine mistakes rather to focus on solving problems				
WP11	Alignment learning, development and performance with business objectives				
WP12	Encouraging employee participation in the organisation at all levels				
WP13	Communicating business vision and goals to all levels and across projects and functions				
WP14	Promote cross organisational communication, vertical and horizontal				
WP15	Involving all workers in decision making so organisation gets full benefit of workforce competence				
WP16	Promoting cross divisional dialogue, continual discussions on how to improve performance				
WP17	Making information accessible to all, across levels, projects and functions				
WP18	Increase line of sight and visibility across the whole organisation, open communication in real time				
WP19	Provide feedback on employee contributions to achieving business goals				
WP20	Provide recognition for contribution to business goals				
WP21	Executive commitment to developing capability of workforce				
WP22	Provide employees with sufficient resources to pursue goals				
WP23	Provide employees with sufficient training to pursue goals				
WP24	Provide employees with sufficient authority to pursue goals				
WP25	Individuals take personal responsibility for their own learning and development				

WP26	Opportunities for formal learning are facilitated by the organisation				
WP27	Custom design learning to specifically address identified workforce need				
WP28	Apply a variety of activities, in-house and external to provide learning opportunities for workforce				
WP29	Reward and recognise participants' success in learning and development (formal or informal)				
WP30	Increase self-esteem of workers, give them an identity, a sense of belonging and purpose				
WP31	Create increased value for in-house development programme, partner with local institutions				
WP32	Develop a culture of innovation				
WP33	Manage individual learning, plan and organise learning towards agreed growth targets				
WP34	Seek credit from local educational institutions for on-the-job learning				
WP35	Provide learning spaces close to the work, exploit IT capability				
WP36	Define and develop workforce in work competencies, the competencies strategic to business				
WP37	Integrate learning across projects, functions and business units				
WP38	Partner with local educational institutions for certification				
WP39	Provide informal learning opportunities				
WP40	Provide full-time or part-time temporary assignments				
WP41	Allow worker participation in special projects to build capacity				

WP42	Train internal trainers, mentors and coaches				
WP43	Establish line management responsibility for learning and development of subordinates				
WP44	Provide overall training consistency				
WP45	Formalise employee mentoring and coaching				
WP46	Create separate career track for trainers, and coaches (coaching vs managerial				
WP47	Manage career development programs for all staff at all levels				
WP48	Align individual career progression with business objectives				
WP49	Embed performance management as a people management function				
WP50	Succession management				
WP51	Providing 360-degree feedback to workers to encourage improvement				
WP52	Exploit job rotation to increase potential for multi-skilling				
WP53	Promote employee engagement with the organisation, develop a sense of ownership in workers				
WP54	Reward and motivate individuals				
WP55	Establish baselines from which performance improvement efforts are progressed				
WP56	Standardise compensation and reward systems and deploy as incentives for desired performance				
WP57	Develop a culture of every day learning and continuous improvement				

WP58	Create a learning environment, social and physical structures as well as resources				
WP59	Develop workgroups/teams to balance skill sets and increase capacity				
WP60	Provide learning options and resources appropriate for construction sites				
WP61	Knowledge management				
WP62	Ensure the diffusion of technology across levels, projects and functions				
WP63	Allow flexible employment practices to target a diverse range of workers				
WP64	Re-employing retired highly skilled and experienced people in training, mentoring and coaching				
WP65	Ensuring employment equity				
WP66	Exploit technology for learning provision and knowledge generation, capture and diffusion				
	Others (Please describe)				

THANK YOU FOR YOUR TIME

APPENDIX III CASE STUDIES

ANNEX 3.1 CASE STUDY INVITATION

19 December 2014

TO WHOM IT MAY CONCERN

University of Central Lancashire

Professor Akintola Akintoye
BSc(Hons) MSc PhD FRICS FCIOB FinstCM
Dean of School
Grenfell-Baines School of Architecture,
Construction and Environment
University of Central Lancashire
Preston PR1 2HE
Telephone 01772 893210
Fax 01772 892916
Email AAkintoye@uclan.ac.uk
www.uclan.ac.uk

AN EVALUATION OF THE ADEQUACY AND EFFECTIVENESS OF THE CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEMS IN NIGERIA

This is to confirm that **Gloria Unoma Ene** is conducting pioneering research on the above topic within the Grenfell-Baines School of Architecture, Construction and Environment, at the University of Central Lancashire, United Kingdom.

The research is investigating the requirements needed for a **skills training model to enable construction firms to optimise business performance.** Given this, you have been identified as domain specialist expert in the Nigerian Construction Industry; and as such, cordially invite you to participate in this research. Moreover, subject to your agreement, we would like to engage your company as a case study participant in the development and testing of this training model. Any information you provide as part of this research will be used purely for academic purposes, the results and findings of which will be treated with the utmost confidentiality to meet with the requirements of the Data Protection Act 1998 (DPA) of the United Kingdom.

Please read the attached participant information sheet carefully and complete the consent form. Could you also please write a formal letter approving your organisation's participation in this research?

Should you require any further information or clarification, please do not hesitate to contact me. Thank you.

Yours sincerely,

Professor Jack Goulding
Director of the Centre for Sustainable Development

Email: jsgoulding@uclan.ac.uk
Telephone: +44(0) 1772 894213

INVESTOR IN PEOPLE

PARTICIPANT INFORMATION SHEET

Study Title

AN EVALUATION OF THE ADEQUACY AND EFFICIENCY OF THE CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEM IN NIGERIA

You are being invited to take part in a research study with the above title. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully.

Purpose of the study

Construction firms are the primary beneficiaries of construction skills and construction sites are the primary location for construction skills education and training. There is a need for an education and training system that is effective and efficient which also fits into the construction firm's business strategy. The study is therefore aimed at developing a construction skills training model that will enable construction firms optimise performance by integrating various effective learning approaches into existing business models.

Participation in the study

Why have I been approached?

Your organisation has been identified as specialist domain experts in the Nigerian construction industry and is therefore among a select group of 6 construction firms who have been asked to participate in this pioneering research. There is no compensation for taking part in the study and there is no known risk involved.

What will this study involve?

The study will involve collecting data by interviewing and interacting with management and staff of your organisation both in the office and on construction sites. Interviews will be recorded with all personal data anonymised for privacy and confidentiality. The study will be carried out in three phases. Each phase will require approximately one week to complete and all three phases will be carried out over a period of 12 months. The questions to be asked relate to the knowledge; skills; abilities; performance; and education and training provided to construction workers.

Do we have to take part?

No. It is up to your organisation to decide whether or not to take part. Your participation in the study is voluntary. If you do decide to take part in the study you will be given this information sheet to keep and you are requested to complete the attached consent form and to write a formal letter approving your organisation's participation in the study and return both to the researchers. You are still free to withdraw from the study at any time without giving a reason. In that case, all data collected from your organisation will be deleted from the study.

Benefits

The data collected will provide useful information regarding the development of vital human resource for the Nigerian construction industry.

Confidentiality
If you do not wish your firm's name to appear on any of the records or publications, please state this explicitly on the consent form. Any information you provide as part of this research will be used purely for academic purposes only and will be treated with the utmost confidentiality to meet with the requirements of the Data Protection Act 1998 (DPA) of the United Kingdom. Only people with a legitimate academic need in the University to do so will see data collected from your organisation.

Confidentiality, privacy and anonymity will be ensured in the collection, storage and publication of research material by anonymising all personal data collected, storing data electronically in encrypted files on the University of Central Lancashire secure network and transferring data electronically in encrypted files using encrypted drives where necessary. All personal data will be anonymised in the publication of research findings if required by your firm.

Data generated by this study will be kept securely in paper and electronic form for five years from the end of the project after which it will be destroyed through the University's secure disposal systems.

Results of research study
The results of this study will be used in the researcher's PhD Thesis and will also be used in journal paper publications and presented at conferences.

Reviews
This research study has been approved by the University of Central Lancashire Research Ethics Committee

Contact
For further information or clarification:
Gloria Ene guene@uclan.ac.uk +44 7554841824

Supervisory Team:
Professor J.S. Goulding JSGoulding@uclan.ac.uk.
Dr Godfaurd John GAJohn@uclan.ac.uk

If you have any concerns about the manner in which the research has been conducted, please contact:

Dean of School
Professor Akintola Akintoye
Grenfell-Baines School of Architecture, Construction and Environment
University of Central Lancashire
Preston PR1 2HE
United Kingdom
Email: AAkintoye@uclan.ac.uk
Telephone: 01772 893210
Fax: 01772 892916

Thank you for taking time to read this information sheet.

January 6, 2014

CONSENT FORM

Full title of Project: An evaluation of the adequacy and efficiency of the construction skills education and training system in Nigeria

Name, position and contact address of Researcher:

Gloria Unoma Ene
Grenfell Baines School of Architecture, Construction and Environment
Email: guene@uclan.ac.uk
Telephone: +44 7554841824

Please read the following statements and initial the boxes to indicate your agreement

	Please initial box
We confirm that we have read and understand the information sheet, dated January 6, 2014 for the above study and have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
We understand that our organisation's participation is voluntary and that we are free to withdraw at any time, without giving a reason.	☐
We agree to take part in the above study.	☐
We agree that data gathered from our organisation in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research.	☐
We understand that it will not be possible to withdraw our data from the study after final analysis has been undertaken	☐
We agree to the interview / focus group / consultation being audio recorded	☐
We agree to the interview / focus group / consultation being video recorded	☐
We agree to the use of anonymised quotes in publications	☐
We agree that our firm's name may be used in publications and presentations	☐

Name of Participating Firm	Date	Signature & Stamp
Name of Researcher	Date	Signature

AN EVALUATION OF THE ADEQUACY AND EFFICIENCY OF THE CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEM IN NIGERIA

SOCIAL, EMOTIONAL AND COGNITIVE ATTRIBUTES QUESTIONNAIRE

PARTICIPANT INFORMATION SHEET

Study Title

AN EVALUATION OF THE ADEQUACY AND EFFICIENCY OF THE CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEM IN NIGERIA

You are being invited to take part in a research study with the above title. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully.

Purpose of the study

Construction firms are the primary beneficiaries of construction skills and construction sites are the primary location for construction skills learning. There is a need for a learning and development system that is effective and efficient which also fits into the construction firm's business strategy. The study is therefore aimed at developing a construction skills learning model that will enable construction firms optimise performance by integrating various effective learning approaches into existing business models.

Participation in the study

You have been identified as an intermediate skilled worker in one of the three construction firms that are participating in this pioneering research.

It is up to you to decide whether or not to take part. Your completing of the attached questionnaire will imply that you have consented to take part in the study. If you do decide to take part, you are still free to withdraw at any time without giving a reason. In that case your completed questionnaire will be deleted from the study. If, however, your completed questionnaire is anonymised at the time of collection (i.e. there is no way to link you with the questionnaire you completed) withdrawal will not be possible.

You will be given an appropriate time by your line manager in which to complete the questionnaire and it will take you about 1 hour 30 minutes to complete. Please answer all questions as honestly as possible and return the completed questionnaire to the researcher. There is no compensation for taking part in the study and there is no known risk involved.

Benefits

The data collected will provide useful information regarding the development of vital human resource for the Nigerian construction industry.

Confidentiality

In order to ensure that all information will remain confidential, please do not include your name. Any information you provide as part of this research will be used purely for academic purposes only and will be treated with the utmost confidentiality to meet with the requirements of the Data Protection Act 1998 (DPA) of the United Kingdom. Only people with a legitimate academic need will see your actual completed questionnaire.

Confidentiality, privacy and anonymity will be ensured in the collection, storage and publication of research material by anonymising all personal data collected, storing data electronically in encrypted files on the University of Central Lancashire secure network and transferring data electronically in encrypted files using encrypted drives where necessary. All personal data will be anonymised in the publication of research findings.

Data generated by this study will be kept securely in paper and electronic form for five years from the end of the project after which it will be destroyed through the University's secure disposal systems.

Results of research study

The results of this study will be used in the researcher's PhD Thesis and will also be used in journal paper publications and presented at conferences.

Reviews

This research study has been approved by the University of Central Lancashire Research Ethics Committee

Contact

For further information or clarification:

Gloria Ene

guene@uclan.ac.uk

+44 7554841824

If you have any concerns about the manner in which the research has been conducted:

Dean

Grenfell-Baines School of Architecture, Construction and Environment

University of Central Lancashire

Preston PR1 2HE

United Kingdom

Email: AAkintoye@uclan.ac.uk

Telephone: 01772 893210

Fax: 01772 892916

Thank you for taking time to read this information sheet.

January 6, 2014

PART 1

GENERAL INFORMATION

ID No.: …… Age ……. Male ☐ Female ☐

Specific Skill(s): ……

Number of years of experience with skill: ……..

Number of years with organisation: ……

Number of years of relevant schooling: ……

Number of years of apprenticeship: ……..

Latest grade in mathematics (please state examination): ……..

……..

Highest educational qualification: ……..

PART TWO

SOCIAL ATTRIBUTES

Section A - Communication skills

Section B - Social skills

Section C - Business-like attitude

WHAT I AM LIKE - Section A Communication

The following are statements that allow people to describe themselves. There are no right or wrong answers since people are just different. Please read the sentence across. First decide which one of the two parts of the statement best describes you; then go to that side of the statement and tick whether that is actually true of you, or somehow true of you. You will tick just one of the four boxes for each statement.

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
1	☐	☐	Some people divert or end conversations that are of no interest to them	**BUT**	Some people will continue in conversations that are of no interest to them but of interest to the other person	☐	☐
2	☐	☐	Some people adjust to the other person's level when they approach them for conversation. (They sit if the other person is sitting and they stand if the other person is standing)	**BUT**	Some people choose the level that is most convenient for them when they approach another person for conversation. They sit or stand as they choose	☐	☐
3	☐	☐	Some people are able to read the mood of the person they are conversing with by looking at them	**BUT**	Some people are unable to read the mood of the person they are conversing with by looking at them	☐	☐
4	☐	☐	Some people will continue a conversation until they understand what the other person is trying to convey	**BUT**	Some people will end a conversation without understanding what the other person is trying to convey	☐	☐
5	☐	☐	Some people make eye contact when they are speaking to another person	**BUT**	Some people will not look the other person in the eye when speaking to them	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
6	☐	☐	Some people will ask questions if they do not understand the other person's explanation during a discussion instead of trying to figure it out by themselves later	**BUT**	Some people will not ask questions if they do not understand the other person's explanation during a discussion but would rather try to figure it out themselves later	☐	☐
7	☐	☐	Some people try to see things from the other person's perspective during a discussion	**BUT**	Some people do not try to see things from the other person's perspective during a discussion	☐	☐
8	☐	☐	Some people will pay attention to the words as well as the body language of the person they are taking to, their facial expressions, hand movement, nods, etc.	**BUT**	Some people will pay attention to the words that are being said by the person they are talking to and not notice their facial expressions, hand movements, nods, etc.	☐	☐
9	☐	☐	Some people are able to express their ideas clearly without having to repeat themselves before they are understood	**BUT**	Some people repeat themselves to get people to understand their ideas	☐	☐
10	☐	☐	Some workers are able to use drawings and sketches to help explain their ideas concerning work on the construction site	**BUT**	Some workers are unable to use drawings and sketches to help explain their ideas concerning work on the construction site	☐	☐
11	☐	☐	Some people feel free to walk up to someone and start a conversation	**BUT**	Some people do not feel free to walk up to someone and start a conversation	☐	☐
12	☐	☐	Some people have difficulty putting their feelings and thoughts into words	**BUT**	Some people find it easy to put their feelings and thoughts into words	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
13	☐	☐	Some people do not ask questions when they are conversing with another person	**BUT**	Some people ask questions when they are conversing with another person	☐	☐
14	☐	☐	Some people anticipate possible causes of confusion in communicating their feelings and emotions and deal with them up front	**BUT**	Some people will deal with any confusion that arises from their communication only when and if questioned about it	☐	☐
15	☐	☐	Some people think about the best way to pass on a message or instruction to another person (in person, over the phone, by email, by SMS, in a memo, etc.)	**BUT**	Some people pass on a message or instruction by the most convenient channel without giving thought to the most appropriate.	☐	☐
16	☐	☐	Some workers feel free to politely voice out their disagreement with a supervisor or manager		Some workers do not feel free to voice out their disagreement with a supervisor or manager	☐	☐
17	☐	☐	Some people consider cultural barriers when they are planning communications	**BUT**	Some people do not consider cultural barriers when they are planning communications	☐	☐
18	☐	☐	Some people tend to say what they think without worrying about how the other person perceives it, assuming that they will be able to work it out later	**BUT**	Some people consider how what they say will be perceived by the other person before saying it	☐	☐
19	☐	☐	Some people use hand gestures and facial expressions when they are talking to another person	**BUT**	Some people do not use hand gestures and facial expressions when talking to another person	☐	☐
20	☐	☐	Some workers are able to carry out instructions on site which they have received by email or some other electronic media	**BUT**	Some workers are only able to carry out instructions on site which they have received verbally	☐	☐

WHAT I AM LIKE - Section B Social skills

The following are statements that allow people to describe themselves. There are no right or wrong answers since people are just different. Please read the sentence across. First decide which one of the two parts of the statement best describes you; then go to that side of the statement and tick whether that is actually true of you, or somehow true of you. You will tick just one of the four boxes for each statement.

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
1	☐	☐	Some people try to consider the other person's feelings when they are discussing with them	**BUT**	Some people see no need to consider the other person's feelings when they are discussing with them	☐	☐
2	☐	☐	Some people consider how their words and actions will affect other people	**BUT**	Some people speak and act as they deem right whether or not this affects other people	☐	☐
3	☐	☐	Some people give advice to friends or co-workers only when asked to do so	**BUT**	Some people give advice to friends or co-workers even when it is unsolicited	☐	☐
4	☐	☐	Some people are at ease only with people they know	**BUT**	Some people are at ease even with people they do not know	☐	☐
5	☐	☐	Some people always make time for their friends who are in need	**BUT**	Some people make time for their friends who are in need when they are not busy	☐	☐
6	☐	☐	Some people will wait for someone else to finish talking before they make their own relevant contribution to the discussion	**BUT**	Some people will interrupt someone else to add their relevant contribution to the discussion	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
7	☐	☐	Some people hate situations where they are expected to socialise	**BUT**	Some people enjoy situations where they are expected to socialise	☐	☐
8	☐	☐	Some people will insist that their friend change from a poor decision they are about to make	**BUT**	Some people will allow their friend to make their own decision without sharing an opinion	☐	☐
9	☐	☐	Some people will control their bad mood when at a social event or business meeting and pretend that all is well	**BUT**	Some people will express their bad mood even when at a social event or business meeting and never pretend about how they feel	☐	☐
10	☐	☐	Some people when their friend or co-worker asks for their honest opinion will tell them the truth even if it hurts but will be as gentle as possible if the news is not good	**BUT**	Some people, when asked by a friend or co-worker for their honest opinion will not tell them the truth because people don't really want to hear bad news	☐	☐
11	☐	☐	Some people, when someone who is usually pleasant is unpleasant to them, assume the other person is having a bad day	**BUT**	Some people, when someone who is usually pleasant is unpleasant to them, will reconsider their opinion about the person	☐	☐
12	☐	☐	Some people when their friend or co-worker seems irritable will assume there is a reason for it and ask them about it	**BUT**	Some people when their friend or co-worker seems irritable will get annoyed and irritable themselves to show them that anyone can get irritable for no reason	☐	☐
13	☐	☐	Some people try to adjust their behaviour according to the situation they are in or to the person they are interacting with	**BUT**	Some people would rather be themselves and not adjust to a situation or to the person they are interacting with	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
14	☐	☐	Some people, when they get into an argument with someone, get shaky and nervous and try to end it as soon as possible	**BUT**	Some people when they get into an argument with someone settle in and prepare for a spirited battle of wits	☐	☐
15	☐	☐	Some people when they receive praise for an achievement they have reached with the help of others say thanks and try to spread the credit to the others as well	**BUT**	Some people when they receive praise for an achievement they have reached with the help of others say thank you modestly and leave it at that	☐	☐
16	☐	☐	Some people, if a friend or co-worker confides a secret to them, will keep the confidence no matter what the secret is.		Some people, if a friend confides a secret to them, will not keep the confidence because they cannot keep secrets	☐	☐
17	☐	☐	Some people when having a heated discussion with a friend or co-worker keep total control of their emotions	**BUT**	Some people when having a heated discussion with a friend or co-worker always lose control of their emotions	☐	☐
18	☐	☐	Some people when they get into an argument with someone talk it out calmly and try to minimise the damage	**BUT**	Some people, when they get into an argument with a co-worker, deal with it forcefully and even get physical on occasion when the situation calls for it	☐	☐
19	☐	☐	Some people when they have done something wrong feel comfortable about apologising	**BUT**	Some people when they have done something wrong feel too proud to apologise	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
20	☐	☐	Some people when they sense tension between themselves and a friend or co-worker try to deal with the problem right away and clear the air	**BUT**	Some people when they sense tension between themselves and a friend or co-worker try as much as possible to avoid dealing with the situation and hope that the tension will go away on its own	☐	☐
21	☐	☐	Some people, when they get into an argument with a co-worker, apprehensively prepare for an uncomfortable situation	**BUT**	Some people when they get into an argument with someone get into a screaming match	☐	☐
22	☐	☐	Some people say thank you and are happy when someone does something for them	**BUT**	Some people are not happy when someone does something for them and will not say thank you	☐	☐
23	☐	☐	Some people will take care of other people's property as if it was their own	**BUT**	Some people will only take care of their own property	☐	☐
24	☐	☐	Some people will keep the promises they make no matter the difficulty	**BUT**	Some people will keep the promises they make only if it is convenient to do so	☐	☐
25	☐	☐	Some people ask for help at work when they are having difficulties with the work	**BUT**	Some people will not ask for help at work when they are having difficulties at work because of pride	☐	☐
26	☐	☐	Some people feel comfortable to ask questions when they are talking with other people	**BUT**	Some people do not feel comfortable about asking questions when they are talking to other people	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
27	☐	☐	Some people feel good about helping someone at work who is having difficulty with the work	**BUT**	Some people do not feel good about helping someone at work who is having difficulty with the work	☐	☐
28	☐	☐	Some people get into a lot of fights	**BUT**	Some people rarely ever get into fights	☐	☐
29	☐	☐	Some people believe they know it all and have no need to learn and to improve	**BUT**	Some people do not believe they know it all and are always willing to learn and to improve	☐	☐
30	☐	☐	Some people are bossy always telling people what work to do	**BUT**	Some people are not bossy and ask people to do the work	☐	☐

WHAT I AM LIKE - Section C Business-like attitude

The following are statements that allow people to describe themselves. Remember there are no right or wrong answers since people are just different. Please read the sentence across. First decide which one of the two parts of the statement best describes you; then go to that side of the statement and tick whether that is actually true of you, or somehow true of you. You will tick just one of the four boxes for each statement.

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
1	☐	☐	Some people are happy when their work is among the best	**BUT**	Some people are happy when their co-worker is performing better than they are	☐	☐
2	☐	☐	Some people follow through on plans at work by themselves	**BUT**	Some people prefer to be told what to do and when to do it at work	☐	☐
3	☐	☐	Some people strive to meet the needs of others through their work	**BUT**	Some people strive to meet their own personal needs through their work	☐	☐
4	☐	☐	Some people are satisfied with their work when it is rated as average	**BUT**	Some people feel terrible when their work is considered as average	☐	☐
5	☐	☐	Some people tend to lose important things and documents	**BUT**	Some people are able to keep track of important things and documents	☐	☐
6	☐	☐	Some people are good at meeting deadlines and keeping appointments	**BUT**	Some people are not good at meeting deadlines and keeping appointments	☐	☐
7	☐	☐	Some people know what to do next at all times at work	**BUT**	Some people often find themselves at a loss for what to do next at work	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
8	☐	☐	Some people are always punctual and show up when they say they will	**BUT**	Some people have excuses for not being punctual and not showing up when they say they will	☐	☐
9	☐	☐	Some people find it difficult to prioritise their tasks	**BUT**	Some people find it easy to prioritise their tasks	☐	☐
10	☐	☐	Some people are able to carry through their ideas without depending on any one else	**BUT**	Some people, when they have problems immediately think of all the people (friends, family, friends of friends) who can help them	☐	☐
11	☐	☐	Some people take pride in their work and will do it even if they will not be paid for it	**BUT**	Some people only work for a living and will only work if they will be paid for it	☐	☐
12	☐	☐	Some people feel good when they make the organisations they belong to function better	**BUT**	Some people prefer to focus on completing their given tasks satisfactorily rather than improving the organisation they belong to.	☐	☐
13	☐	☐	Some people are able to identify long term issues/problems or opportunities	**BUT**	Some people focus on the current issues/problems or opportunities	☐	☐
14	☐	☐	Some workers do not align their current actions with the strategic goals of the organisations they work for	**BUT**	Some workers align their current actions with the strategic goals of the organisations they work for	☐	☐
15	☐	☐	Some people treat new problems as barriers to success	**BUT**	Some people treat new problems as opportunities for success	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
16	☐	☐	Some people believe that getting along with people is not a requirement for success	**BUT**	Some people believe that getting along with people is important to success	☐	☐
17	☐	☐	Some workers know and understand the strategic goals of the organisation they work for	**BUT**	Some workers are in the organisation just to earn a salary	☐	☐
18	☐	☐	Some people do not see how their actions in the workplace contribute to the overall success or failure of the organisation they work for	**BUT**	Some people are aware of the effect their actions have on the overall success or failure of the organisation they work for	☐	☐
19	☐	☐	Some people will leave the work they are doing to do other things when the work gets uninteresting or difficult	**BUT**	Some people can stay focused on a problem without getting distracted	☐	☐
20	☐	☐	Some people are willing to accept higher levels of responsibility than is the norm for the position they occupy in the organisation	**BUT**	Some people are only willing to accept levels of responsibility equal to or lower than their position in the organisation	☐	☐
21	☐	☐	Some people feel no need to be friendly, respectful or courteous to visitors, customers, colleagues, supervisors or managers in the workplace	**BUT**	Some people are innately friendly and remain polite, respectful and courteous even when provoked	☐	☐
22	☐	☐	Some people are willing to go along with the status quo, following laid down procedures to the letter	**BUT**	Some people are willing to challenge existing procedures and systems in a constructive way	☐	☐
23	☐	☐	Some people can easily see the innovative 'other' option and frequently suggest improvement strategies and encourage others to do the same	**BUT**	Some people do not easily see improvement strategies to existing systems and do not encourage others to do so	☐	☐

PART THREE

EMOTIONAL ATTRIBUTES

Section A - Creativity

Section B - Craftsmanship

Section C - Motivation

WHAT AM I LIKE - Section A Creativity

ID No.: …….. Age …….. Male ☐ Female ☐

The following are statements that allow people to describe themselves. There are no right or wrong answers since people are just different. Please read the sentence across. First decide which one of the two parts of the statement best describes you; then go to that side of the statement and tick whether that is actually true of you, or somehow true of you. You will tick just one of the four boxes for each statement.

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
1	☐	☐	Some people spend a lot of time thinking about what other people think of them	**BUT**	Some people could not be bothered about what other people think of them	☐	☐
2	☐	☐	Some people enjoy it when things are uncertain and unpredictable	**BUT**	Some people hate it when things are uncertain and unpredictable	☐	☐
3	☐	☐	Some people find it easy to think up new ideas	**BUT**	Some people find it difficult to think up new ideas	☐	☐
4	☐	☐	Some people like to make controversial statements just to provoke a response	**BUT**	Some people steer away from controversy of any sort	☐	☐
5	☐	☐	Some people are good at making a plan and sticking to it	**BUT**	Some people are not good at making a plan and sticking to it	☐	☐
6	☐	☐	Some people will attempt to solve problems that in principle have no solution	**BUT**	Some people will not attempt to solve a problem that has no apparent solution	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
7	☐	☐	Some people are afraid of failure	**BUT**	Some people are not afraid of failure	☐	☐
8	☐	☐	Some people need to have a place for everything and to put everything in its place	**BUT**	Some people do not need to have a place for everything and put things wherever it suits them	☐	☐
9	☐	☐	Some people need to work with the certainty that they are following the correct procedure for solving a problem	**BUT**	Some people do not need to work with the certainty that they are following correct procedure for solving a problem	☐	☐
10	☐	☐	Some people believe that rules exist for good reasons	**BUT**	Some people believe that rules exist so they can be broken	☐	☐
11	☐	☐	Some people feel that a logical step-by-step method is best for solving problems	**BUT**	Some people feel that inspiration and imagination are the best methods for solving problems	☐	☐
12	☐	☐	Some people like to go along with the flow and follow tradition		Some people like to go against the flow and do things differently from other people	☐	☐
13	☐	☐	Some people spend a lot of time daydreaming	**BUT**	Some people do not have the time for daydreaming	☐	☐
14	☐	☐	Some people often have vivid dreams	**BUT**	Some people rarely have vivid dreams	☐	☐
15	☐	☐	Some people use daydreams as a source of new ideas	**BUT**	Some people do not use daydreams as a source of new ideas	☐	☐

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
16	☐	☐	Some people like to see the bigger picture	**BUT**	Some people like to see the details	☐	☐
17	☐	☐	Some people usually read a newspaper article from the beginning word for word	**BUT**	Some people usually skim newspaper article looking for the main points only	☐	☐
18	☐	☐	Some people prefer to multitask, working on more than one project at the same time	**BUT**	Some people prefer to focus on one project at a time	☐	☐
19	☐	☐	Some people prefer to have written or verbal instructions to enable then get from A to B	**BUT**	Some people prefer to look at a map to enable them get from A to B	☐	☐
20	☐	☐	Some people, when they walk into a room, immediately notice if something is out of place	**BUT**	Some people, when they walk into a room, do not notice if something is out of place	☐	☐

WHAT I AM LIKE - Section B Craftsmanship

The following are statements that allow people to describe themselves. Remember there are no right or wrong answers since people are just different. Please read the sentence across. First decide which one of the two parts of the statement best describes you; then go to that side of the statement and tick whether that is actually true of you, or somehow true of you. You will tick just one of the four boxes for each statement.

	Actually True for me	Somehow True for me				Somehow True for me	Actually True for me
1	☐	☐	Some people see nothing wrong in doing a bad job at work if they can get away with it	**BUT**	Some people will do a good job whether or not their supervisor is around	☐	☐
2	☐	☐	Some people see work as just work	**BUT**	Some people feel a sense of pride in their work	☐	☐
3	☐	☐	Some people perform with their best effort whether the job is mental or manual, pleasant or unpleasant	**BUT**	Some people perform their best effort only when the work is mental and pleasant	☐	☐
4	☐	☐	Some people take pride in the quality of their work whether on the job or off the job	**BUT**	Some people do not feel a sense of pride in the quality of their work whether on the job or off the job	☐	☐
5	☐	☐	Some people strive to ensure that their work is of the highest possible quality	**BUT**	Some people consider striving towards the highest quality a waste of time once the minimum requirements have been met	☐	☐
6	☐	☐	Some people strive towards excellence always looking for how to improve on their work	**BUT**	Some people prefer to leave excellence to the next person	☐	☐
7	☐	☐	Some people consider craftsmanship a menial attribute	**BUT**	Some people consider craftsmanship an artistic attribute	☐	☐

GLOBAL MOTIVATION SCALE (GMS-28)

Frédéric Guay, Geneviève A. Mageau et Robert J. Vallerand

Society for Personality and Social Psychology, 29:8, 2003

Scale Description

This scale assesses people's global motivation toward behaving in general in their life as a whole. There are 7 constructs: intrinsic motivation toward knowledge, accomplishment and stimulation, as well as external, introjected and identified regulations and amotivation. There are 28 items (4 items for each of the 7 subscales) assessed on a 7-point scale.

References

Guay, F., Mageau, G., & Vallerand, R.J.. On the hierarchical structure of self-determined motivation : A test of top-down and bottom-up effects. Personality and Social Psychology Bulletin, 29, 992-1004

GENERAL ATTITUDES

Indicate to what extent each of the following statements corresponds generally to the reasons why you do different things.

Does not correspond accordingly			Corresponds moderately			Corresponds completely
1	2	3	4	5	6	7

1. In general I do things in order to feel pleasant emotions.	1	2	3	4	5	6	7
2. In general I do things because I do not want to disappoint certain people.	1	2	3	4	5	6	7
3. In general I do things in order to help myself become the person I aim to be.	1	2	3	4	5	6	7
4. In general I do things because I like making interesting discoveries.	1	2	3	4	5	6	7
5. In general I do things because I would beat myself up for not doing them.	1	2	3	4	5	6	7

Does not correspond accordingly			Corresponds moderately			Corresponds completely
1	2	3	4	5	6	7

6.	In general I do things because of the pleasure I feel as I become more and more skilled.	1	2	3	4	5	6	7
7.	In general I do things although I do not see the benefit in what I am doing.	1	2	3	4	5	6	7
8.	In general I do things because of the sense of well-being I feel while I am doing them.	1	2	3	4	5	6	7
9.	In general I do things because I want to be viewed more positively by certain people.	1	2	3	4	5	6	7
10.	In general I do things because I chose them as means to attain my objectives.	1	2	3	4	5	6	7
11.	In general I do things for the pleasure of acquiring new knowledge.	1	2	3	4	5	6	7
12.	In general I do things because otherwise I would feel guilty for not doing them.	1	2	3	4	5	6	7
13.	In general I do things for the pleasure I feel mastering what I am doing.	1	2	3	4	5	6	7

Does not correspond accordingly			Corresponds moderately			Corresponds completely
1	2	3	4	5	6	7

14. In general I do things although it does not make a difference whether I do them or not.	1	2	3	4	5	6	7
15. In general I do things for the pleasant sensations I feel while I am doing them.	1	2	3	4	5	6	7
16. In general I do things in order to show others what I am capable of.	1	2	3	4	5	6	7
17. In general I do things because I chose them in order to attain what I desire.	1	2	3	4	5	6	7
18. In general I do things for the pleasure of learning new, interesting things.	1	2	3	4	5	6	7
19. In general I do things because I force myself to do them.	1	2	3	4	5	6	7
20. In general I do things because of the satisfaction I feel in trying to excel in what I do.	1	2	3	4	5	6	7
21. In general I do things even though I do not have a good reason for doing them.	1	2	3	4	5	6	7

Does not correspond accordingly			Corresponds moderately			Corresponds completely
1	2	3	4	5	6	7

22. In general I do things for the enjoyable feelings I experience.	1	2	3	4	5	6	7
23. In general I do things in order to attain prestige.	1	2	3	4	5	6	7
24. In general I do things because I choose to invest myself in what is important to me.	1	2	3	4	5	6	7
25. In general I do things for the pleasure of learning different interesting facts.	1	2	3	4	5	6	7
26. In general I do things because I would feel bad if I do not do them.	1	2	3	4	5	6	7
27. In general I do things because of the pleasure I feel outdoing myself.	1	2	3	4	5	6	7
28. In general I do things even though I believe they are not worth the trouble.	1	2	3	4	5	6	7

PART FOUR

COGNITIVE ATTRIBUTES

Section A - General Mental Ability

Instructions: Please circle the correct answer. Only one answer is allowed for each question.

1. Round 907.457 to the nearest tens place

   A 908.00

   B 910.00

   C 907.50

   D 900.00

   E 907.46

2. What is the average of: 12, 15, 23, 10

   A 10

   B 15

   C 16

   D 12

   E 20

3. How many of the six pairs of items listed below are exact duplicates?

Nieman, K. M.	Neiman, K. M.
Hoff, J. P.	Hoff, J. P.
Thomas, G. K.	Thomas, C. K.
Pino, L. R.	Pine, L. R.
Hammar, C. G.	Hamnar, C. G.
Warner, T. S.	Wanner, T. S.

   A 1

   B 2

   C 3

   D 4

   E 5

4. On Monday and Thursday, lunch cost ₦ 543 total. On Tuesday and Wednesday, lunch cost N 354 on each day. On Friday, lunch cost ₦ 789. What was the average daily cost?

A 319

B 375

C 390

D 408

E 423

5. What is 1230.932567 rounded to the nearest hundredths place?

A 1200

B 1230.932567

C 1230.930

D 1230.00

E 1230.9330

6 PRESENT RESENT

A Similar

B Contradictory

C Not related

7 Subtract the second and third numbers from the first number from the following row of numbers and then round up to the nearest tenths place:

134.679 45.548 67.8807

A 21.30

B 21.25

C -58.07

D -59.00

E 1.00

8 What is the mathematical average of the number of weeks in a year, the number of quarters in a year and the number of days in January?

A 36

B 33

C 32

D 31

E 29

9. TEAR TIER Do these words

A have similar meanings

B have contradictory meanings

C mean neither the same or the opposite

10. OPTIONAL OPTICIAN

A have similar meanings

B have contradictory meanings

C mean neither the same or the opposite

11 Over the course of the week, Fred spent N 2849 on lunch. What was the average cost per day?

A 407

B 357

C 651

D 293

E541

12. A roast was cooked at 180^0 C in an oven for 4 hours. The internal temperature rose from 12^0 C to 86^0 C. What was the average rise in temperature?

A 15.2

B 18.5

C 20.2

D 22.8

E 32.03

13. FLAMMABLE INFLAMMABLE

A Similar meaning

B Contradictory meaning

C Not related

14. PRESENT ABSENT

A Similar meaning

B Contradictory meaning

C Not related

15. PRESENT RESENT

A Similar meaning

B Contradictory meaning

C Not related

16. In the number 743.25 which digit represents the tenths

A 2

B 3

C 4

D 5

E 7

17. Add 0.98 + 45.102 + 32.3333 + 31.00009

A 368.573

B 210.536299

C 109.41539

D 99.9975

E 80.8769543

18. WISH ORDER

A Similar meaning

B Contradictory meaning

C Not related

19. EXIT ENTRANCE

A Similar meaning

B Contradictory meaning

C Not related

20. Find 0.12 ÷ 1

A 12

B 1.2

C .12

D .012

E .0012

21. (9 ÷ 3) X (8 ÷ 4)

A 1

B 6

C 72

D 576

E 752

22. 6 X 0 X 5 =

A 30

B 11

C 25

D 0

E 27

23. SHELVE TABLE

A Similar meaning

B Contradictory meaning

C Not related

24. KINDLE ENKINDLE

A Similar meaning

B Contradictory meaning

C Not related

25. 7.95 ÷ 1.5 =

A 2.4

B 5.3

C 6.2

D 7.3

E 7.5

26. -32 + 7 =

A -25

B 25

C -26

D 26

E 27

27. -37 + -47 =

A 64

B -84

C 65

D -75

E -66

28. 41% =

A 4.1

B .41

C .041

D .0041

E .00415

29. HIRE FIRE

A Similar meaning

B Contradictory meaning

C Not related

30. SUITABLE WORTHY

A Similar meaning

B Contradictory meaning

C Not related

31. REST BREAK

A Similar meaning

B Contradictory meaning

C Not related

32. Which of the following is not a whole number followed by its square?

A 1, 1

B 6, 36

C 8, 64

D 10, 100

E 11, 144

33. Which number is largest?

A 32.000

B 23000

C 32.00

D 3.200

E 230.00

34. Anayo realised that he had 2 more 50 Kobo coins than he had originally thought in his pocket. If all the change in his pocket is in 50 Kobo coins and it totals N 17.50, how many 50 Kobo coins did he originally think were in his pocket?

A 27

B 29

C 31

D 33

E 35

35. TRAIN WEEP

A Similar meaning

B Contradictory meaning

C Not related

36. ADD AND

A Similar meaning

B Contradictory meaning

C Not related

37. LIFT WOODEN

A Similar meaning

B Contradictory meaning

C Not related

38. There are 12 more mangos than oranges in a basket of 36 mangos and oranges. How many mangos are in the basket?

A 12

B 15

C 24

D 28

E 36

39. Which of the following correctly identifies 4 consecutive odd integers where the sum of the middle two integers is equal to 24?

A 5, 7, 9, 11

B 7, 9, 11, 13

C 9, 11, 13, 15

D 11, 13, 15, 17

E 13, 15, 17, 19

40. What is the next number in the sequence? 6, 12, 24, 48,

A 72

B 96

C 108

D 112

E 124

41. A train travels 20 feet in 1/5 seconds. At this speed, how many feet will it travel in three seconds

A 60

B 150

C 200

D 300

E 500

42. When rope is selling at N .15 a metre, how many metres can you buy for 60 Kobo?

A 10

B 4

C 5

D 6

E 2

43. The eighth month of the year is:

A OCTOBER

B ANGUST

C SEPTEMBER

D MAY

E AUGUST

44. Which number in the following group of numbers represents the smallest amount?

A 6

B .25

C. 7

D 1

E .33

45. BOTTLES SCISSORS

A Similar meaning

B Contradictory meaning

C Not related

46. TUNNEL ROUTE

A Similar meaning

B Contradictory meaning

C Not related

47. SOCKET PICTURE

A Similar meaning

B Contradictory meaning

C Not related

48. ELLIPSE OVAL

A Similar meaning

B Contradictory meaning

C Not related

49. TOMB TOME

A Similar meaning

B Contradictory meaning

C Not related

50. WHEAT GRAIN

A Similar meaning

B Contradictory meaning

C Not related

ANNEX 3.3 PERFORMANCE ASSESSMENT SHEET

AN EVALUATION OF THE ADEQUACY AND EFFICIENCY OF THE CONSTRUCTION SKILLS EDUCATION AND TRAINING SYSTEM IN NIGERIA

PERFORMANCE ASSESSMENT

Please tick as appropriate

SUPERVISOR ☐

PEER ☐

SELF ☐

ID No.: …….. Age …….. Male Female

WHAT HAVE I ACHIEVED

Please indicate to what extent each of the following statements corresponds to actual performance at work

No Performance	Poor performance		Moderate performance		Good performance		Excellent Performance
0	1	2	3	4	5	6	7

1	Exhibits a positive attitude and admirable behaviour at all times	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Produces quality work even under stress caused by time pressures	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Completes tasks with minimum wastage in materials	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Consciously manages time ensuring that down time is reduced to a minimum	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Proposes superior selection of tools and equipment for a task	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Applies the highest level of technical skill in completing work requirement	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	Creates effective working relationships with team members	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**

No Performance	Poor performance		Moderate performance		Good performance		Excellent Performance
0	1	2	3	4	5	6	7

8	Cooperates with other team members by sharing information openly	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9	Listens carefully and responds thoughtfully in exchanging work information	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10	Develops and maintains a positive relationship with co-workers	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11	Avoids being late or absent especially during peak or critical phases of work	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
12	Ability to work under pressure	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
13	Maintains the highest levels of productivity, often exceeding set targets	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
14	Willingly takes on additional responsibilities such as coaching, mentoring or supervision when demanded by the situation	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**

ANNEX 3.4 SEMI STRUCTURED INTERVIEW SCHEDULE

Business Environment	The extent to which the business environment supports workforce learning and development in terms of:	
	Vision and business strategy	The extent to which learning is part of the vision and business strategy of the organisation
	Strategic planning	The extent to which the organisation plans and organises for workforce learning and development to meet strategic business goals
	HRM	The organisation's strategy for recruiting and sustaining needed skills
	Communication	The extent to which communication is structured and organised to facilitate effective flow of information
The Learning Dynamics	The extent to which learning is at the core of how the organisation operates in terms of:	
	Continuous learning	The commitment to learning everyday
	Learning content	The appropriate determination of learning content
	Learner variables	The influence of learner dispositions on learning content, design and delivery
	Motivation to learn	The extent to which the organisation motivates individual workers to learn
The Worker Learner	The extent to which the organisation considers workers' personal development	
	Career progression	
	Holistic learning and development	
The Learning Environment	The extent to which the organisational culture and social setting supports learning in terms of:	
	Social structures	
	Physical structures	
Learning approaches	The extent to which the organisation employs appropriate pedagogy and learning methods in facilitating learning at	
	On the job	
	Off the job	
Learning Investment	The extent to which the organisation is willing to commit time and money to learning in terms of:	
	Learning resources	The extent of resource provision
	Learning policy	Organisational and management commitment to learning
Performance management & alignment	The extent to which the organisation is evaluates and monitors performance with the focus on improvement in line with goals	
	Learning resources	The extent of resource provision
	Learning policy	Organisational and management commitment to learning
Improvement plan	The extent to which the organisation intends to improve on learning within the organisation in terms of:	
	Alignment with business strategy	
	Creating a learning organisation	
	Creating a motivated and high performing workforce	
	Innovation	

ANNEX 3.5 PSYCHOMETRIC TEST ANALYSIS

Descriptives

		N	Mean	Std. Deviation
Communication Skills	CASE STUDY 1	97	72.53	11.977
	CASE STUDY 2	45	75.89	13.516
	CASE STUDY 3	21	66.57	10.371
	Total	163	72.69	12.474
Social Skills	CASE STUDY 1	97	73.78	12.109
	CASE STUDY 2	45	80.02	13.124
	CASE STUDY 3	21	73.48	11.826
	Total	163	75.47	12.606
Business-like Attitude	CASE STUDY 1	97	69.54	9.795
	CASE STUDY 2	45	75.53	10.856
	CASE STUDY 3	21	70.71	10.125
	Total	163	71.34	10.412
Creativity	CASE STUDY 1	97	66.22	9.092
	CASE STUDY 2	45	58.40	6.814
	CASE STUDY 3	21	62.14	7.094
	Total	163	63.53	8.927
Craftsmanship	CASE STUDY 1	97	73.46	15.928
	CASE STUDY 2	45	81.62	14.440
	CASE STUDY 3	21	76.48	11.737
	Total	163	76.10	15.383
Motivation	CASE STUDY 1	97	64.39	12.953
	CASE STUDY 2	45	65.40	8.601
	CASE STUDY 3	21	58.95	9.124
	Total	163	63.97	11.564
Numeracy Skills	CASE STUDY 1	97	37.87	19.477
	CASE STUDY 2	45	60.53	12.300
	CASE STUDY 3	21	33.24	14.580
	Total	163	43.53	20.135
General Mental Ability	CASE STUDY 1	97	21.21	9.098
	CASE STUDY 2	45	31.87	6.373
	CASE STUDY 3	21	15.52	5.202
	Total	163	23.42	9.709
Intrinsic motivation to know	CASE STUDY 1	97	80.04	16.478
	CASE STUDY 2	45	79.36	9.355
	CASE STUDY 3	21	63.33	12.471
	Total	163	77.70	15.319
Overall performance	CASE STUDY 1	97	74.27	6.879
	CASE STUDY 2	45	80.04	6.378
	CASE STUDY 3	21	60.86	6.110
	Total	163	74.13	8.733

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Communication Skills	Between Groups	1249.270	2	624.635	4.171	.017
	Within Groups	23959.773	160	149.749		
	Total	25209.043	162			
Social Skills	Between Groups	1291.895	2	645.947	4.227	.016
	Within Groups	24452.669	160	152.829		
	Total	25744.564	162			
Business-like Attitude	Between Groups	1115.151	2	557.576	5.425	.005
	Within Groups	16445.609	160	102.785		
	Total	17560.761	162			
Creativity	Between Groups	1924.739	2	962.370	14.016	.000
	Within Groups	10985.825	160	68.661		
	Total	12910.564	162			
Craftsmanship	Between Groups	2049.287	2	1024.644	4.518	.012
	Within Groups	36285.940	160	226.787		
	Total	38335.227	162			
Motivation	Between Groups	637.981	2	318.990	2.427	.092
	Within Groups	21026.866	160	131.418		
	Total	21664.847	162			
Numeracy Skills	Between Groups	18346.359	2	9173.179	31.011	.000
	Within Groups	47328.267	160	295.802		
	Total	65674.626	162			
General Mental Ability	Between Groups	4995.318	2	2497.659	38.896	.000
	Within Groups	10274.314	160	64.214		
	Total	15269.632	162			
Intrinsic motivation to know	Between Groups	4989.457	2	2494.729	12.086	.000
	Within Groups	33026.813	160	206.418		
	Total	38016.270	162			
Overall performance	Between Groups	5275.517	2	2637.759	59.614	.000
	Within Groups	7079.513	160	44.247		
	Total	12355.031	162			

Post Hoc Tests

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) CASE STUDY FIRM	(J) CASE STUDY FIRM	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Communication Skills	CASE STUDY 1	CASE STUDY 2	-3.363	2.207	.283	-8.58	1.86
		CASE STUDY 3	5.954	2.945	.110	-1.01	12.92
	CASE STUDY 2	CASE STUDY 1	3.363	2.207	.283	-1.86	8.58
		CASE STUDY 3	9.317*	3.234	.012	1.67	16.97
	CASE STUDY 3	CASE STUDY 1	-5.954	2.945	.110	-12.92	1.01
		CASE STUDY 2	-9.317*	3.234	.012	-16.97	-1.67
Social Skills	CASE STUDY 1	CASE STUDY 2	-6.239*	2.230	.016	-11.51	-.96
		CASE STUDY 3	.307	2.975	.994	-6.73	7.35
	CASE STUDY 2	CASE STUDY 1	6.239*	2.230	.016	.96	11.51
		CASE STUDY 3	6.546	3.267	.115	-1.18	14.28
	CASE STUDY 3	CASE STUDY 1	-.307	2.975	.994	-7.35	6.73
		CASE STUDY 2	-6.546	3.267	.115	-14.28	1.18
Business-like Attitude	CASE STUDY 1	CASE STUDY 2	-5.997*	1.829	.004	-10.32	-1.67
		CASE STUDY 3	-1.178	2.440	.880	-6.95	4.59
	CASE STUDY 2	CASE STUDY 1	5.997*	1.829	.004	1.67	10.32
		CASE STUDY 3	4.819	2.679	.173	-1.52	11.16
	CASE STUDY 3	CASE STUDY 1	1.178	2.440	.880	-4.59	6.95
		CASE STUDY 2	-4.819	2.679	.173	-11.16	1.52
Creativity	CASE STUDY 1	CASE STUDY 2	7.816*	1.495	.000	4.28	11.35
		CASE STUDY 3	4.074	1.994	.105	-.64	8.79
	CASE STUDY 2	CASE STUDY 1	-7.816*	1.495	.000	-11.35	-4.28
		CASE STUDY 3	-3.743	2.190	.205	-8.92	1.44
	CASE STUDY 3	CASE STUDY 1	-4.074	1.994	.105	-8.79	.64
		CASE STUDY 2	3.743	2.190	.205	-1.44	8.92
Craftsmanship	CASE STUDY 1	CASE STUDY 2	-8.158*	2.716	.009	-14.58	-1.73
		CASE STUDY 3	-3.012	3.625	.684	-11.59	5.56
	CASE STUDY 2	CASE STUDY 1	8.158*	2.716	.009	1.73	14.58
		CASE STUDY 3	5.146	3.980	.401	-4.27	14.56
	CASE STUDY 3	CASE STUDY 1	3.012	3.625	.684	-5.56	11.59
		CASE STUDY 2	-5.146	3.980	.401	-14.56	4.27

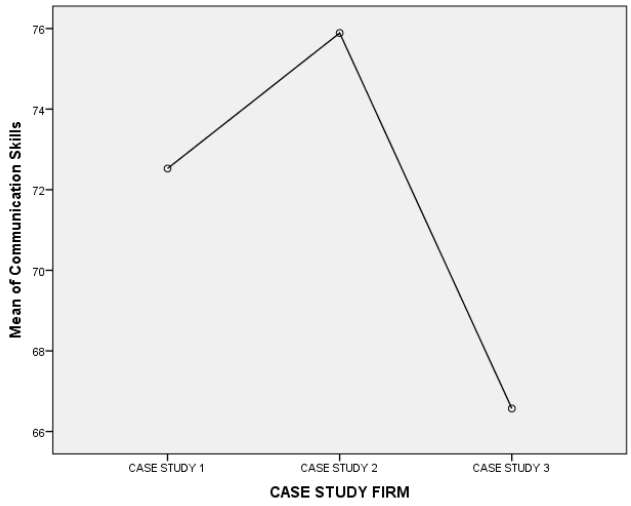
Multiple Comparisons (cont'd)

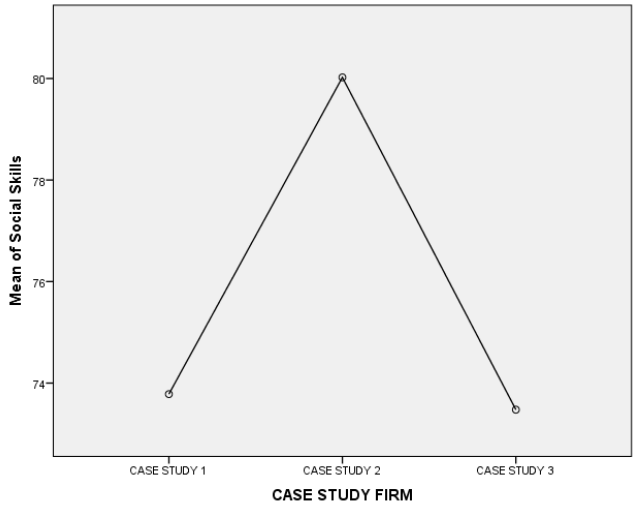
Tukey HSD

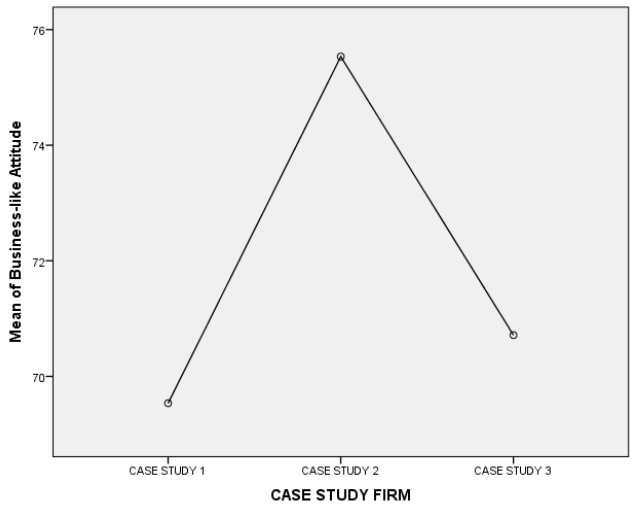
Dependent Variable	(I) CASE STUDY FIRM	(J) CASE STUDY FIRM	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
Motivation	CASE STUDY 1	CASE STUDY 2	-1.008	2.068	.877	-5.90	3.88
		CASE STUDY 3	5.439	2.759	.123	-1.09	11.97
	CASE STUDY 2	CASE STUDY 1	1.008	2.068	.877	-3.88	5.90
		CASE STUDY 3	6.448	3.030	.087	-.72	13.61
	CASE STUDY 3	CASE STUDY 1	-5.439	2.759	.123	-11.97	1.09
		CASE STUDY 2	-6.448	3.030	.087	-13.61	.72
Numeracy Skills	CASE STUDY 1	CASE STUDY 2	-22.667*	3.102	.000	-30.01	-15.33
		CASE STUDY 3	4.628	4.139	.504	-5.17	14.42
	CASE STUDY 2	CASE STUDY 1	22.667*	3.102	.000	15.33	30.01
		CASE STUDY 3	27.295*	4.545	.000	16.54	38.05
	CASE STUDY 3	CASE STUDY 1	-4.628	4.139	.504	-14.42	5.17
		CASE STUDY 2	-27.295*	4.545	.000	-38.05	-16.54
General Mental Ability	CASE STUDY 1	CASE STUDY 2	-10.660*	1.445	.000	-14.08	-7.24
		CASE STUDY 3	5.682*	1.929	.010	1.12	10.25
	CASE STUDY 2	CASE STUDY 1	10.660*	1.445	.000	7.24	14.08
		CASE STUDY 3	16.343*	2.118	.000	11.33	21.35
	CASE STUDY 3	CASE STUDY 1	-5.682*	1.929	.010	-10.25	-1.12
		CASE STUDY 2	-16.343*	2.118	.000	-21.35	-11.33
Intrinsic motivation to know	CASE STUDY 1	CASE STUDY 2	.686	2.591	.962	-5.44	6.82
		CASE STUDY 3	16.708*	3.458	.000	8.53	24.89
	CASE STUDY 2	CASE STUDY 1	-.686	2.591	.962	-6.82	5.44
		CASE STUDY 3	16.022*	3.797	.000	7.04	25.00
	CASE STUDY 3	CASE STUDY 1	-16.708*	3.458	.000	-24.89	-8.53
		CASE STUDY 2	-16.022*	3.797	.000	-25.00	-7.04
Overall performance	CASE STUDY 1	CASE STUDY 2	-5.776*	1.200	.000	-8.61	-2.94
		CASE STUDY 3	13.411*	1.601	.000	9.62	17.20
	CASE STUDY 2	CASE STUDY 1	5.776*	1.200	.000	2.94	8.61
		CASE STUDY 3	19.187*	1.758	.000	15.03	23.35
	CASE STUDY 3	CASE STUDY 1	-13.411*	1.601	.000	-17.20	-9.62
		CASE STUDY 2	-19.187*	1.758	.000	-23.35	-15.03

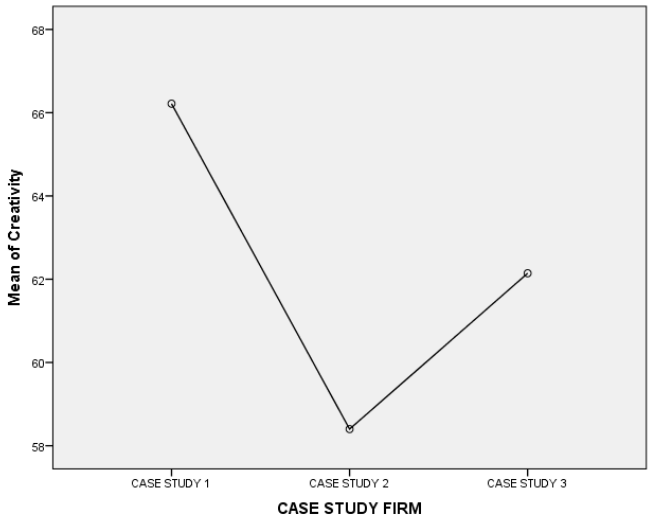
*. The mean difference is significant at the 0.05 level.

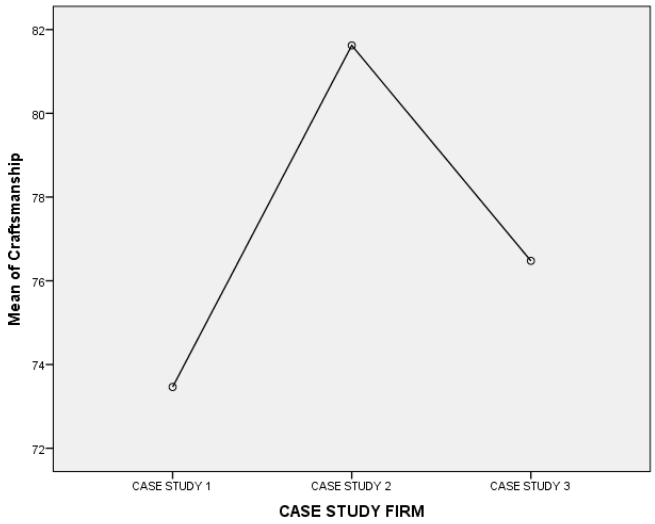
Means Plots

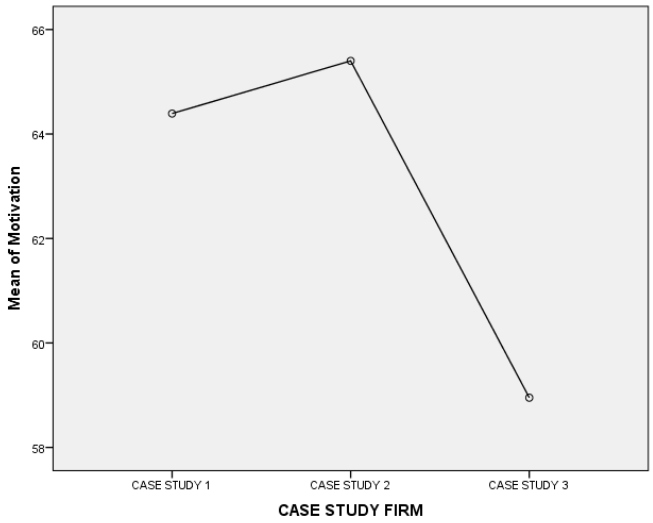

Mean of Communication Skills
76
74
72
70
68
66
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM

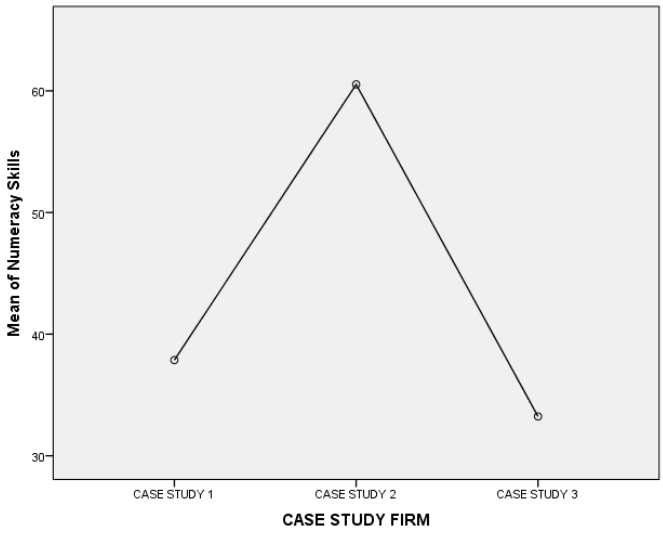

Mean of Social Skills
80
78
76
74
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM


Mean of Business-like Attitude
76
74
72
70
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM


Mean of Creativity
68
66
64
62
60
58
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM


Mean of Craftsmanship
82
80
78
76
74
72
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM


Mean of Motivation
66
64
62
60
58
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM


Mean of Numeracy Skills
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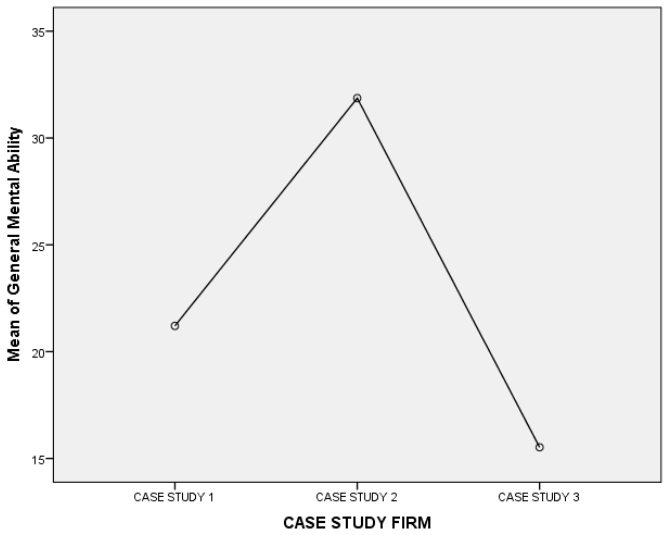
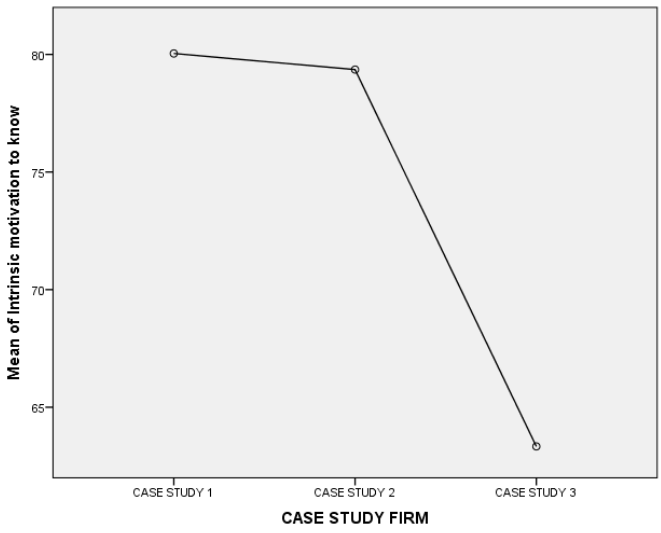
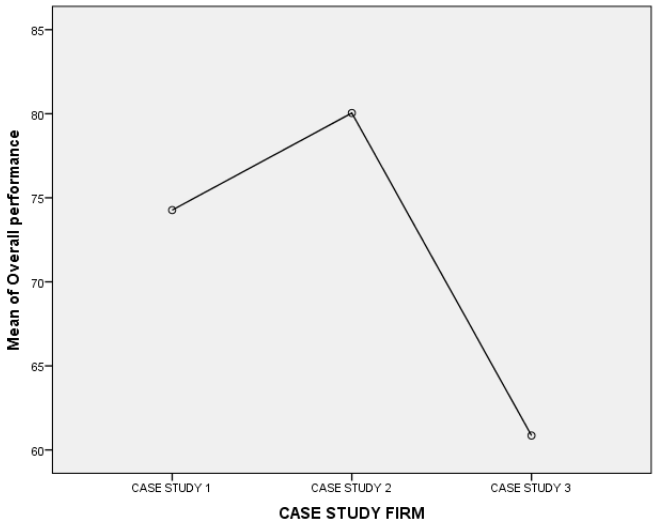
50
40
30
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM


Mean of General Mental Ability
35
30
25
20
15
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM


Mean of Intrinsic motivation to know
80
75
70
65
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM


85
80
75
70
65
60
Mean of Overall performance
CASE STUDY 1
CASE STUDY 2
CASE STUDY 3
CASE STUDY FIRM

APPENDIX IV MODEL DEVELOPMENT

ANNEX 4.1 MODELLING TECHNIQUE SELECTION QUESTIONNAIRE

Purpose of the questionnaire:

To select an appropriate tool that is fit for purpose and which construction organisation would feel comfortable using for workforce development.

Background

A workforce development approach is being developed within your construction organisation and your input will be helpful in deciding an appropriate tool for its modelling.

Instructions

This document consists of 7 pages:

Page 1: Introduction and instructions

Page 2 - 5: Fact sheets for the following four modelling tools

- Balanced Scorecard
- Capability Maturity Model
- Generic Design and Construction Process Protocol
- Quality Function Deployment

Pages 6 - 7: Questionnaire

After the short presentation on each of the above four tools, you are kindly requested to rate the four tools for five factors by simply selecting the appropriate boxes in the questionnaire on the last two pages of this document.

Your kind assistance in completing this questionnaire promptly is deeply appreciated.

Thank you in advance for your contribution.

Gloria Ene

November 2015

Capability Maturity Model (CMM)	
Description	CMM is a process improvement approach that provides organisations with the essential elements of effective processes that ultimately improve their performance. It can be used to guide process improvement across a project, division or an entire organisation.
Developed	2002
Purpose	Initially developed for software engineering improvement but has evolved into a step-by-step framework which enables organisations to assess their position on a capability framework and then provides guidelines on what should be the organisation's improvement priorities. They also provide a means for comparing an organisation's practices with the state of art of an industry.
Key Features	Attribute/components/subcomponents: Define the scope of the model, for the purpose of constructing and describing all aspects covered by an enterprise in relation to the focus of improvement (e.g. business process, risk management, knowledge management, PPP project implementation, learning and development). Maturity levels: A maturity level is a well-defined evolutionary plateau for organisational process improvement. Maturity levels determine the stages of maturity of the focus of improvement starting at non-existent or ad hoc to fully integrated with business and optimising. They also prescribe an evolutionary path for increasing an organisation's capabilities in the focus area of improvement. Levels of maturity are typically recognised when an organisation exhibits a benchmark set of evolutionary attributes, characteristics, patterns or practices, and these provide the basis for assessment and consequently prescribe a road map for moving from one level of maturity to the next. Assessment tool: This provides the means for a detailed and comprehensive assessment of an organisation's capability in each of the attributes, components and subcomponents for the focus of improvement
Uses	Project management, process management, process development, business management, management, IT management, human resource development
Philosophy	Performance in an organisation is optimised when best practices in each of the processes that define the organisation are identified, repeated, defined, managed, measured and then continuously reviewed and improved upon.

Quality Function Deployment (QFD)	
Description	QFD is a structured approach to identifying and prioritising customer needs or requirements and translating them into specific plans to produce products to meet those needs.
Developed	1966
Purpose	It involves transforming qualitative user demands into quantitative parameters, deploying functions and methods to meet those parameters in terms of quality, design quality, systems, subsystems, components and ultimately elements in the manufacturing process.
Key Features	Voice of the customer: This phrase describes the stated and unstated customer needs and requirements House of Quality: A matrix that displays the customers wants and needs (Voice of the Customer) along the left and the development team's technical response to meeting those wants and needs along the top. The house of quality matrix consists of several sections or submatrices joined in various ways and each containing information related to the others. Typically, the house consists of six major sections, these being: the voice of the customer; the planning matrix (market research and strategic planning); the technical response/design requirements; the relationships (impact of technical response on customer needs and benefits); the technical correlations; and the technical matrix sections.
Uses	Product and production process development
Philosophy	A comprehensive quality management system that systematically links the stated and unstated needs of the customer with various business functions and organisational processes, effectively aligning the entire organisation to a common goal.

Balanced Scorecard (BSC)	
Description	BSC is a strategic performance management system that organisations use to communicate goals and objectives, align everyday tasks with strategy, prioritise projects, products and services, and measure and monitor progress towards strategic targets. BSC takes a holistic view of an organisation integrating its operational capacity, internal processes, customer focus and financial perspectives.
Developed	1992
Purpose	A performance management tool that focuses on both high level strategy and low level measures by taking the organisation's strategic vision and breaking it down into specific actionable steps to take on a day to day basis.
Key Features	Strategic objectives: Continuous improvement activities that must be done to implement strategy. Improving performance in the objectives found in the organisational capacity perspective enables the organisation to improve on its internal processes which in turn enables the organisation to create desirable results in the customer and financial perspectives. Strategy mapping: A simple diagram that shows the logical connections between strategic objectives. Key Performance Indicator (KPI): KPIs indicate progress towards a desired outcome. For each objective, at least one measure or KPI is identified and tracked over time. They provide an objective way to see if strategy is working. Cascading: Translating the organisation wide scorecard (Tier 1) down to business units, supporting units or departments (Tier 2) and then to teams and individuals (Tier 3) ensuring that focus across all levels is on strategy and is consistent.
Uses	Strategic planning and strategic management
Philosophy	Financial measures are inadequate for guiding and evaluating long term capabilities and customer relations which are critical for success. A balanced set of performance measures that focus on long term success would include operational capacity, internal business processes, customer focus and financial perspectives.

Generic Design and Construction Process Protocol (GDCPP)	
Description	GDCPP is a framework model that is capable of representing the diverse interests of all parties involved in the process which is sufficiently repeatable and definable to allow IT to be devised to support this management and information management
Developed	1995
Purpose	A process protocol developed to create a collective and shared understanding of production processes in order to eliminate the conventional chaotic and ad hoc approach of construction.
Key Features	Whole project view: The GDCPP approach ensures that all issues are considered from both a business and technical point of view while recognising the interdependencies of activities throughout the duration of a facility from inception to final demolition. A consistent process: Is expected to facilitate a process of continual improvement in design and construction through reducing ambiguity and providing a standard approach to performance measurement, evaluation and control. Progressive design fixity: A 'stage gate' approach which allows for the application of a consistent planning and review procedure throughout the process Stakeholder involvement and teamwork: The active involvement of all participants especially in the early phases of a project, may subsequently help to foster a team environment and encourage appropriate and timely communication and decision-making. Feedback: the phase review process facilitates a means by which project experiences, both successes and failures, can be recorded and improve the ability of the industry to learn from past experiences.
Uses	Design and construction process management
Philosophy	To provide a consistent planning and review procedure throughout the construction process by adopting established and successful practices in the manufacturing sector.

QUESTIONNAIRE

Please indicate the extent you agree with or disagree with the following statements by ticking the appropriate boxes. Please tick only one box in each row.

BSC

The Balanced Scorecard tool:	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Disagree**
Is flexible and can capture the essential elements of workforce development				
Is clear and management and staff will find it easy to understand				
Is simple such that management and staff will find it easy to use				
Has potential for providing for the continuous improvement processes involved in workforce development				
Allows for alignment of organisational strategy with workforce development processes				

CMM

The Capability Maturity Model tool:	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Disagree**
Is flexible and can capture the essential elements of workforce development				
Is clear and management and staff will find it easy to understand				
Is simple such that management and staff will find it easy to use				
Has potential for providing for the continuous improvement processes involved in workforce development				
Allows for alignment of organisational strategy with workforce development processes				

QFD

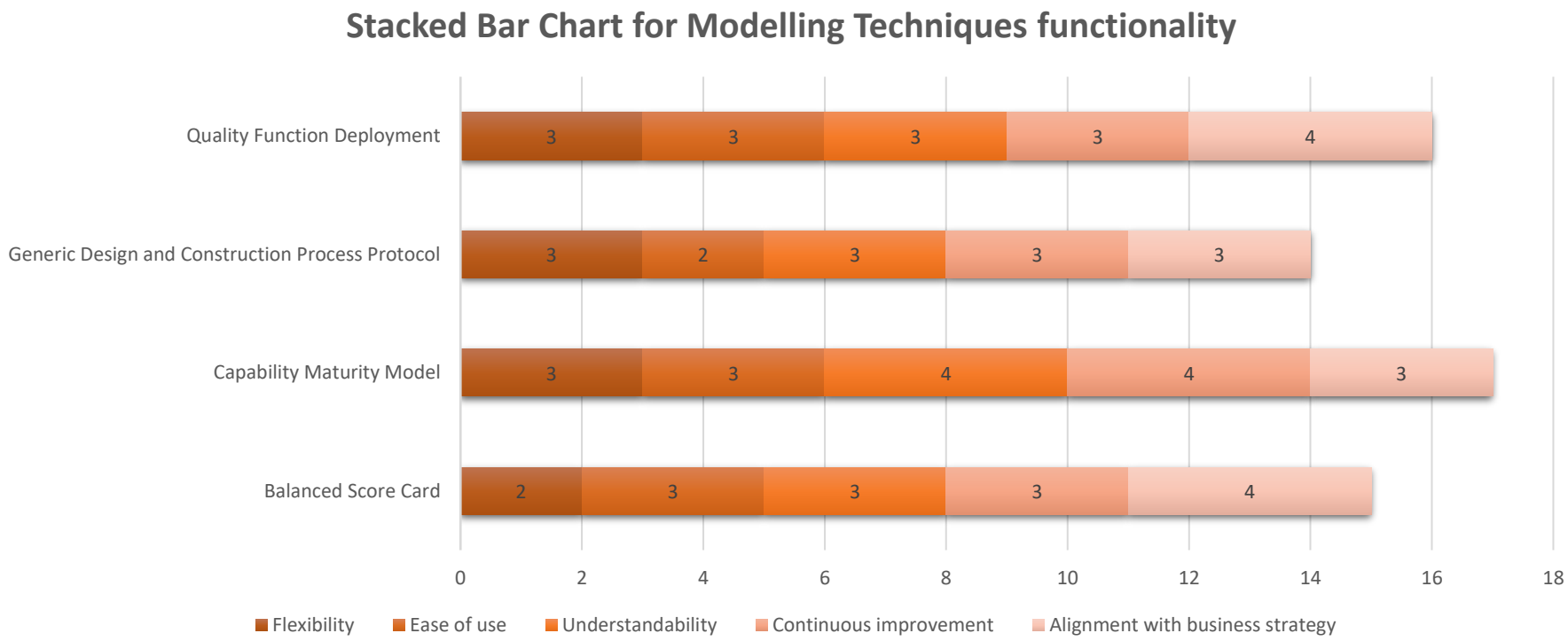
The Quality Function Deployment tool:	Strongly Disagree	Disagree	Agree	Strongly Disagree
Is flexible and can capture the essential elements of workforce development				
Is clear and management and staff will find it easy to understand				
Is simple such that management and staff will find it easy to use				
Has potential for providing for the continuous improvement processes involved in workforce development				
Allows for alignment of organisational strategy with workforce development processes				

GDCPP

The Generic Design and Construction Process Protocol tool:	Strongly Disagree	Disagree	Agree	Strongly Disagree
Is flexible and can capture the essential elements of workforce development				
Is clear and management and staff will find it easy to understand				
Is simple such that management and staff will find it easy to use				
Has potential for providing for the continuous improvement processes involved in workforce development				
Allows for alignment of organisational strategy with workforce development processes				

Thank you for your time

ANNEX 4.2 MODELLING TECHNIQUE SELECTION RESULTS



ANNEX 4.3 WORKFORCE LEARNING AND DEVELOPMENT KEY PRACTICES

Workplace learning and development key practices for shaping the workforce

WORKPLACE LEARNING AND DEVELOPMENT BEST PRACTICE FOR SHAPING THE WORKFORCE	SUPPORTING REFERENCES	EXPLORATORY SURVEY RATING (See Table 5.17)	CASE STUDY INTERVIEW SUPPORT (See Table 6.10)
Determining an appropriate workforce design and skills mix in line with business goals	Bowes (2008); Cunningham and Hillier (2013); Harrison (2009); Hodges deTuncq and Schmidt (2013); Holbeche, 2012; Ley *et al.* (2008); Sambartolo (2015); WEF(2016)	0.80	Agreed in principle but not practiced
Attracting and recruiting the best people and retaining and developing a professional workforce. Establish line management responsibility and accountability for learning and development of subordinates	Castledine and Renwick (2012); Cunningham and Hillier (2013); Eraut (2004); Harrison (2009); Horwitz (2013); WEF (2016)	0.72	Agree in principle, practice is inconsistent and not formalised
Gathering robust data on workforce capabilities and performance and using data to understand the capability of workforce and to improve strategic planning	Harrison (2009); Marquardt (2011); Rogers *et al.* (2012); Sambartolo (2015)	0.80	Agree in principle, practice is inconsistent and not formalised
Establishing communication mechanisms coordinate commitments and continuous improvement of work practices across all levels and functional units	Bryson *et al.* (2005); Cunningham and Hillier (2013); Harrison (2009); Marquardt (2011); Rogers *et al.* (2012)	0.80*	Agree in principle, practice is inconsistent and not formalised
Aligning overall WLD and performance to business objectives	Abdel-Wahab *et al.* (2008); Harrison (2009); Hodges deTuncq and Schmidt (2013); Marquardt (2011); Vaughan (2008)	0.81**	Agree in principle

Workplace learning and development key practices for building a learning environment

WORKPLACE LEARNING AND DEVELOPMENT BEST PRACTICE FOR BUILDING A LEARNING ENVIRONMENT	SUPPORTING REFERENCES	EXPLORATORY SURVEY RII RATING (See Table 5.17)	CASE STUDY INTERVIEW SUPPORT (See Table 6.10)
Develop a culture of everyday learning and continuous improvement across all levels and functional units; learning from good practice, incidents and even mistakes	Balle and Handlinger (2012); Carrim and Basson (2013); Cunningham and Hillier (2013); Dankbaar (2008); Eraut (2004); Harrison (2009); Horwitz (2013); Marquardt (2011); Rogers *et al.* (2012); Varghese (2012); Vaughan (2008)	0.88	Agree in principle
Creating an environment where knowledge is generated, shared and utilised by the workforce in line with the organisation's objectives Providing, developing and sustaining appropriate learning resources for entire workforce. Documenting lessons learned for future uses as learning resource	Cunningham and Hillier (2013); Dankbaar (1999); Du Plessis *et al.* (1999); Ley, *et al.* (2008); Harrison (2009); Horwitz (2013); Marquardt (2011); Vaidyanathan and Howell (2007); Van Riel (2008); Varghese (2012); Vaughan (2008); WEF (2016)	0.78	Agree in principle, practice is inconsistent and not formalised
Providing, appropriate and innovative learning spaces close to work	Dankbaar (1999)	0.85	Agree in principle
Encouraging and exploiting employee engagement, empowerment and participation	Bryson *et al.* (2005); Harrison (2009); Marquardt (2011); Rogers *et al.* (2012); Van Riel (2008)	0.79	Agree in principle
Maintaining cohesion and consistency in workforce practices across projects and business units through improved communication, coordination and alignment with business objectives	Harrison (2009); Holbeche (2009); Marquardt (2011); Moorby (1996); Sambartolo (2015); Van Riel (2008)	0.81	Agree in principle

WLD key practices for managing project WLD

WORKPLACE LEARNING AND DEVELOPMENT BEST PRACTICE FOR PROJECT WLD	SUPPORTING REFERENCES	EXPLORATORY SURVEY RII RATING	CASE STUDY INTERVIEW SUPPORT (See Table 6.10)
Purposefully determine the required knowledge, skills and competencies critical to the success of the project and strategically plan for and manage them quantitatively	Cunningham and Hillier (2013); Harrison (2009); Ley, *et al.* (2008); Marquardt (2011);	0.84	Agree in principle, practice is inconsistent
Exploiting the learning and performance potentials of workgroups, communities of practice	Cunningham and Hillier (2013); Harrison (2009); Marquardt (2011); Rogers *et al.* (2012); Wenger (1998); Wenger *et al.* (2002)	0.86	Agree in principle, practice is inconsistent and not formalised
Developing a structured and accountable approach to WLD and provide a variety of learning and development options appropriate for project sites. Encourage and provide opportunities for testing new ideas for work improvement on project sites	Cunningham and Hillier (2013); Eraut (2004); Harrison (2009); Manuti *et al.* (2015); Marquardt (2011); Metso (2014); Vaughan (2008); WEF (2016); Zenke (1985)	0.80	Agree in principle
Purposive and qualitative management of performance	Marquardt (2011); Rogers *et al.* (2012)	0.80*	Agree in principle
Continually aligning learning and performance to project and organisational goals. Balancing learning and development options between organisation and project priorities with individual priorities and needs	Abdel-Wahab (2012); Cunningham and Hillier (2013); Harrison (2009); Rogers *et al.* (2012); Van Riel (2008)	0.81**	Agree in principle

WLD key practices for individual worker learning and development

WORKPLACE LEARNING AND DEVELOPMENT BEST PRACTICE FOR INDIVIDUAL WORKER LEARNING AND DEVELOPMENT	SUPPORTING REFERENCES	EXPLORATORY SURVEY RII RATING	CASE STUDY INTERVIEW SUPPORT (See Table 6.10)
Agree and support individual worker career development in line with organisation objectives	Ahmad *et al.*, (2015); Blackburn *et al.,* 2013; Carrim and Basson (2013); Cunningham and Hillier (2013); Harrison (2009); Nafukho, (2013)	0.95	Agree in principle
Encourage and support individual learning, improvement and innovation in organisation's competency based processes and in self-directed learning	Bowes (2008); Carrim and Basson (2013); Cunningham and Hillier (2013); Harrison (2009); Illeris (2007)	0.84	Agree in principle, practice is inconsistent and non-formalised
Encourage and support whole person development	Harrison (2009); Hoover *et al.* (2011); Illeris 2002; (Marquardt (2011); Poortman *et al.* (2010); Sambartolo (2015); Wenger (2009)	0.86	Agree in principle
Evaluate and manage individual development and performance	Harrison (2009); Horwitz (2013); Rogers *et al.* (2012)	0.80*	Agree in principle, practice is inconsistent and non-formalised
Align individual development and performance with organisation objectives through targeted reward schemes	Harrison (2009); Rogers *et al.*, 2012	0.81**	Agree in principle, practice is inconsistent and non-formalised

*Performance Management was split into performance management (organisational level), performance management (project level) and performance management (individual level)

** Alignment was split into alignment (organisational level); alignment (project level) and alignment (individual level)

See Section 6.5.3 for rationale.

ANNEX 4.4 MATURITY LEVEL DESCRIPTORS

CLEARDO maturity level descriptors

CLEARDO Maturity Levels	Characteristics
Level 1: Initial	This level may be described as 'ad hoc' in the sense that there are few on no processes in place and, workforce practices are mostly reactive rather than proactive. There are no standards and little cross-functional communication and no automation. There are low levels of trust among workers and managers resulting in knowledge and information sharing being uncommon. Heroics by people are required to get the work done. WLD is dependent on the skills, drive and personality of specific line managers rather than on institutionalised workforce practices. The level is characterised by inconsistencies in learning and development practices. Practices tend to be ritualistic and line mangers are left to their own devices without a common understanding of the responsibilities of management. Managers do not see learning and development as legitimate and valued workplace activities. At this level, the general perception is that management is about producing results and not about producing people who can produce results. At this level, there is a disconnect between organisational objectives and individual career goals. Individuals are unaware of or unengaged with the vision and strategic direction of the organisation. The organisation's expectation for performance is not supported by efforts to continuously and holistically improve individual worker capabilities. Performance management is informal or is limited to appraisals that are not aimed at performance improvement. Learning and development activities on projects are ad hoc and not structured in any way.

	The participation of individual workers or workgroups in decision making is discouraged or is cosmetic; and innovation by individuals or work groups is not encouraged or supported in any form.

Table 8.3 CLEARDO maturity level descriptors (cont'd)

Level 2: Managed	At this level, executive management commits the organisation to continuous improvement of knowledge, skills, motivation and performance of its workforce through providing policies and resources to support and manage the performance of all its line mangers in this regard. Line managers which include project managers, site managers, supervisors, foremen, headmen, group leaders, and gang leaders are prepared and supported to be responsible and account for the learning and development of people who report to them. Individual needs and targets for learning and development are defined and tracked. Learning skills, interpersonal and intrapersonal skills needed for efficient social learning and performance are identified and developed. Vertical and horizontal channels for communication and sharing of knowledge open up. As communication lines open up and are more efficiently managed, organisational vision and goals and project objectives filter down and ideas and suggestions filter up. Individual workers begin to identify with the organisation and a sense of commitment to its goals starts to develop. This is reinforced by acknowledgement and reward of individual worker suggestions and the building of a participatory culture that enables the organisation to benefit from the full capabilities of its workforce. Regular performance of these practices lead to consistency and to people management practices that are repeatable creating a stable environment for work. This level is characterised by capability of work groups and units to meet commitments, regular discussions to identify ways of improving knowledge, skills, process abilities, and performance. A variety of learning approaches are explored and resourced, for instance, collaborative learning potentials of workgroups,

	and coaching and mentoring roles and activities are explored at project level. Although basic workforce practices are consistently performed, there is inconsistency across projects, business units and functions.

Table 8.3 CLEARDO maturity level descriptors (cont'd)

Level 3: Defined	At this level of maturity, common knowledge, skills and process abilities are identified and standardised across the organisation. Learning and development tools and processes for cross-project, cross-business units and cross functional units are available and starting to be adopted. An organisation wide infrastructure that builds on identified best practices that tie the capability of the workforce to strategic business objectives is developed. This establishes the workforce architecture which evolves as business conditions and technologies change. It is now possible to develop a repository of knowledge, skills and processes for each workforce competency. This forms the basis for a database of capabilities in the workforce competencies available to the organisation. As competent individuals are developed, they demand more autonomy in performing work and in decision making. There is a steadier flow of information, communications are streamlined and an environment that supports employee involvement, participation, engagement and empowerment is created. The entire organisation at this level shares the responsibility for developing increasing levels of capability in workforce competencies. Individual career plans are developed and mapped to evolving workforce architecture. This is enabled by adapting workforce practices to encourage and reward growth in workforce competencies. Learning and performance are aligned across workgroups and teams with project objectives. Synergy across projects and business units is gradually built with the open sharing of knowledge, lessons learned and innovation achieved. The Workforce satisfaction and morale is improved. The learning culture of the organisation expands to encompass a culture of continuous improvement where everyone strives to improve on their own capacity and to contribute to the improvement of the workgroup, project and organisation. The organisation continues to demonstrate commitment to WLD by providing innovative learning resources and learning spaces and by adapting policies to allow for

	increased worker participation. Learning options on project sites are varied, timely, flexible, collaborative and compatible with individual learning styles and adult education principles. At this level performance management is established and focused on evaluating the impact of learning and development on individual, project and organisational performance.

Table 8.3 CLEARDO maturity level descriptors (cont'd)

Level 4: Measured	At this level, the organisation develops the ability to manage its capabilities and performance quantitatively by being able to measure the capability of its workforce and the processes used to perform the work. The process starts when competent people perform work, the organisation captures and stores the results of performing the work and develops them as competency-based resources to be reused by others. Effective creation and use of these learning resources leads to the rapid spread of learning and consequently productivity rises. With workforce participation and empowerment, responsibility and authority is transferred to workgroups and managers are freer to become more strategic. Performance is measured within workgroups and performance baselines are established that are then used for planning, target improvement, prediction of organisational capacity for work and strategic decisions. Learning and development processes are now completely controlled and managed and results are predictable. Continuous learning and continuous improvement are completely imbibed into corporate culture and advanced workforce practices are institutionalised. WLD targets are met as defined and workforce satisfaction is high. Learning, development and performance are fully aligned with business objectives. Description of workforce competencies, knowledge, skills and process abilities are periodically assessed to ensure they remain current with the organisation's technologies and business activities. Database of capabilities available to the organisation is continuously updated as workforce competency levels increase. As information flow is speeded up

	and made more efficient there is more visibility across levels, functions and projects. Knowledge generation and diffusion becomes more efficient by exploiting the increasing capabilities of information technology. Opportunities for trying out new ideas on project sites are increasingly available and this is strongly supported by a culture of not laying blame for genuine mistakes. Entire workforce is becoming learning and performance driven and each worker has a sense of ownership of the business and its products with a clear understanding of how their activities contribute to achieving organisational goals. At this level workforce career development paths are tracked and periodically reviewed to ensure targets will be met and remain aligned to individual aspirations and organisational needs. At this level an overall picture of learning and development system can be developed and its impact on performance measured to ensure that synergy is maintained, it remains efficiently resourced and that it delivers value.

Table 8.3 CLEARDO maturity level descriptors (cont'd)

Level 5: Optimising	At this level, the whole organisation is focused on continuous improvement. Quantitative measures from Level 4 are used to guide improvements at this level. Strategic workforce plans are based on quantitative baselines established at the measured level. Impact of improvement activities is continually evaluated and corrective action taken where necessary. Workforce practices are continuously adapted to changes in organisational technology and business strategy. Talent and innovation are continuously sought out and deployed to optimise performance. To retain talent, the organisation offers bonuses, recognition, promotion and share options for improved performance, outstanding performance and innovative contributions towards achieving organisational goals. Individuals are now able to regularly analyse their own work and determine ways to improve on their personal efficiency. Innovation at individual level is integrated into workgroup processes and where successful is further integrated into workforce competencies, knowledge, skills and abilities which are made available to the entire organisation workforce through IT enhanced communication systems. Individuals are fully committed to continuous improvement in performance through learning as these are clearly linked to achieving their career aspirations. Workforce is motivated and satisfied. Opportunities for learning on projects are optimised and this impacts on project performance, knowledge generation and innovation. Learning and development and performance are aligned at all levels and through all levels to the organisation's objectives. Change management is treated as an ordinary business process. At this level, the organisation has created a culture on learning, development and performance excellence.

ANNEX 4.5 VALIDATION QUESTIONNAIRE

PARTICIPANT INFORMATION SHEET

Study Title

A LEARNING 'LEARNING' MODEL FOR OPTIMISED CONSTRUCTION WORKFORCE DEVELOPMENT

You are being invited to take part in a research study with the above title. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully.

Purpose of the study

Construction firms are the primary beneficiaries of construction skills and construction sites are the primary location for construction skills learning and development. There is a need for a learning and development system that is effective and efficient which also fits into the construction firm's business strategy. The study is therefore aimed at developing a construction skills learning model that will enable construction firms optimise performance by integrating various effective learning approaches into existing business models.

Participation in the study

Why have I been approached?

You have been identified as a domain expert in the Nigerian construction industry and are therefore among a select group of 12 experts who have been asked to participate in this aspect of the pioneering research. There is no compensation for taking part in the study and there is no known risk involved.

What will this study involve?

The study will involve examining the workforce learning and development model and assessment tool and responding to a questionnaire (please find attached). The questions asked relate to the appropriateness, objectivity, replicability, practicality, reliability and suitability of the model and assessment tool. Once the questionnaire has been completed, this should be returned to guene@uclan.ac.uk and gloria_ene@hotmail.com. Please answer all questions as honestly as possible and return the completed questionnaire promptly to reach the researcher within two weeks.

Do I have to take part?

No. It is up to you to decide whether or not to take part. Participation is entirely voluntary. Your completing of the attached questionnaire will imply that you have consented to take part in the study. If you do decide to take part, you are still free to withdraw up to one month after returning the questionnaire without giving a reason. In that case your completed questionnaire will be deleted from the study. If, however, your completed questionnaire is anonymised at the time of collection (i.e. there is no way to link you with the questionnaire you completed) withdrawal will not be possible.

Benefits

The data collected will provide useful information regarding the development of vital human resource for the Nigerian construction industry.

Confidentiality
In order to ensure that all information will remain confidential, please do not include your name. Any information you provide as part of this research will be used purely for academic purposes only and will be treated with the utmost confidentiality to meet with the requirements of the Data Protection Act 1998 (DPA) of the United Kingdom. Only people with a legitimate academic need will see your actual completed questionnaire.

Confidentiality, privacy and anonymity will be ensured in the collection, storage and publication of research material by anonymising all personal data collected, storing data electronically in encrypted files on the University of Central Lancashire secure network and transferring data electronically in encrypted files using encrypted drives where necessary. All personal data will be anonymised in the publication of research findings.

Data generated by this study will be kept securely in paper and electronic form for five years from the end of the project after which it will be destroyed through the University's secure disposal systems.

Results of research study
The results of this study will be used in the researcher's PhD Thesis and will also be used in journal paper publications and presented at conferences.

Reviews
This research study has been approved by the University of Central Lancashire Research Ethics Committee

Contact
For further information or clarification:
Gloria Ene
guene@uclan.ac.uk
+44 7554841824

Supervisory Team:
Professor J.S. Goulding JSGoulding@uclan.ac.uk.
Dr Godfaurd John GAJohn@uclan.ac.uk

If you have any concerns about the manner in which the research has been conducted, please contact:

Dean of School
Rob Wallace
School of Engineering
University of Central Lancashire
Preston PR1 2HE
United Kingdom
Email: RRWallace@uclan.ac.uk
Telephone: 01772 893311

Thank you for taking time to read this information sheet.
November 29, 2016

CONSTRUCTION LEARNING AND DEVELOPMENT OPTIMISATION (CLEARDO) MATURITY ASSESSMENT TOOL

VALIDATION QUESTIONNAIRE

Purpose of the questionnaire:

To validate that the learning and development assessment tool is comprehensive, objective, practical, replicable, reliable and suitable for use by construction firms in Nigeria.

Background

This assessment tool was developed as part of the deliverables of a PhD research conducted at the University of Central Lancashire, United Kingdom by Gloria Ene.

Instructions

This document consists of 26 pages:

Page 1: Introduction and instructions

Page 2: Background information on CLEARDO

Pages 3 – 25: 200-item assessment tool

Page 26: Questionnaire

On the last page of this document, you are kindly requested to rate the six validation aspects by simply selecting the appropriate boxes.

Your kind assistance in completing this questionnaire promptly is deeply appreciated. Please kindly return completed form to Gloria Ene by email: guene@uclan.ac.uk and gloria_ene@hotmail.com

Thank you in advance for your contribution.

Gloria Ene

November, 2016

The Construction Learning and Development Optimisation Model (CLEARDO) was designed to enable construction firms to increase workforce learning and development capability from an ad hoc and inconsistent level to managed, defined and quantifiable levels leading up to an optimising level and consequently, optimising performance. The model was developed within three construction firms in Nigeria.

The model focuses on four key dimensions of workforce learning and development in the construction context and these are described in Table 1. The four dimensions are not mutually independent or exclusive but interact and overlap in areas. When adequately resourced and supported, the four dimensions potentially work together to build a strong workforce aligned with an organisation's goals. The attached tool provides aggregated and component assessments of current learning and development maturity levels and highlights areas of low maturity that require focused attention.

Dimension	Description
Shaping the Workforce	Strategic management of the organisation's workforce involving a determination of workforce competencies strategic to the business, outlining an appropriate workforce architecture, putting in place strategies and policies for continuously developing and adapting the workforce to meet the needs of the business
Building a Learning Environment	A responsibility of management to create and support an organisational environment that is pervaded by a culture of continuous learning, continuous improvement, workforce participation, engagement and empowerment, and a drive for optimal performance. This requires setting up social and physical structures that cut across all levels, projects and functional units of the organisation.
Managing the Project Workforce Learning and Development	A responsibility of project management to exploit all the learning potential and opportunities afforded by each construction project to expand the capabilities and competencies of the project workforce, to improve on processes, to innovate and to optimise performance in line with the project objectives and organisational goals
Individual Worker Learning and Development	A social contract between the organisation and the individual worker whereby the organisation encourages and supports the holistic development of the worker, optimising their performance along an agreed path that agrees with the aspirations of the worker for career progression and at the same time aligns with organisational objectives.

Questionnaire

1. Please rate the CLEARDO maturity assessment tool for each validation aspects by selecting an appropriate box. A rating of 1 represents “poor” and 5 represents “excellent”).

Validation Aspects		Scoring Scale				
		Poor				Excellent
		1	2	3	4	5
1.	Degree of appropriateness					
2.	Degree of objectivity					
3.	Degree of replicability					
4.	Degree of practicality					
5.	Overall reliability					
6.	Overall suitability for construction firms					

2. Please comment freely on the model and the assessment tool

……

……

……

……

3. Demographics

Please state the category you represent:

Large construction	Medium construction	Small construction	Academia

Name of your organisation (optional)……

Your position in the organisation……

Years of experience in the construction industry……

THANK YOU FOR YOUR TIME

ANNEX 4.6 CLEARDO ASSESSMENT TOOL

See next page

CONSTRUCTION LEARNING AND DEVELOPMENT OPTIMISATION MODEL (CLEARDO)

A CAPABILITY MATURITY MODEL

Gloria Unoma Ene

2016

SHAPING THE WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Strategic workforce planning	Determine workforce competencies strategic to business	Are there mechanisms in place to determine the workforce competencies required to achieve business objectives as identified in corporate planning documents					
		Are organisations capability requirements in workforce competencies identified and articulated in strategic workforce plans					
	Define competency-based processes	Are there mechanisms to define and update the processes used by capable individuals in performing each workforce competency					
		Are the dependencies between competency-based processes identified and evaluated in order to aggregate interdependent processes into multi-disciplinary processes					
	Determine baselines for processes	Is there a system for collecting, reporting and establishing minimum baseline data for each competency-based process					
		Are the minimum baseline data integrated with the organisation's management information system					
	Outline workforce architecture	Are there strategies for building an organisation-wide framework of competencies that establish the architecture of the organisation's workforce					
		Does the design of the workforce include the various workforce competencies required to perform the organisation's current and future business activities					
	Managers responsible and accountable for learning and development	Are managers aware of their responsibility and accountability for learning and development of the people who report to them?					
		Do managers see learning and development as legitimate and valued workplace activities that produce the people who produce the results they require?					

SHAPING THE WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Workforce practices	Develop a repository of knowledge, skills and process abilities for each workforce competency	Are workforce competencies defined in terms of the common knowledge, skills and processes necessary to conduct construction business					
		Are the descriptions of knowledge skills and process abilities periodically re-assessed to ensure that they remain current with the organisation's technologies and business activities					
	Recruitment strategy	Is there a formal selection process to ensure a thorough evaluation of the skills and qualifications or each candidate (individual or subcontractor)					
		Is there a formal database of skilled workers who are currently working or have worked in the past with the organisation					
	Establish appropriate workforce practices for staffing, compensation and performance management	Are there mechanisms in place to ensure that all workforce management strategies are clear, consistent and logical					
		Is there a compensation strategy that motivates and rewards the skills and behaviour the organisation considers vital for its success					
	Integrate competency based processes across projects and units	Analyse work to identify opportunities to integrate the processes used by different work competencies					
		Define these integrated competency-based processes and tailor work situations for their use					
	Talent and innovation management	Are there systems in place to identify, develop and promote individual talent and to match talented employees to the right jobs across the organisation					
		Are there mechanisms to evaluate the most promising innovations in trial use and if successful implement them across the organisation					

SHAPING THE WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Communication and coordinatio	Developing interpersonal communication and coordination skills	Is there appropriate promotion, recognition, resourcing and training in interpersonal communication and coordination skills among employees to support an organisation-wide learning					
		Are there mechanisms in place to ensure that all employees continually develop the communication and coordination skills needed for structured development of the workforce					
	Establishing communication mechanisms	Is there a formal system of communication (electronic or otherwise) incorporating employees at all levels and across functions and departments					
		Are there mechanisms that support communication among competency-based units					
	Coordinating organisation commitment	Are individuals, workgroups and managers provided with relevant information about organisational performance, project performance, group performance and individual performance in					
		Are there strategies for building a sense of commitment within the organisation, developing shared images of common and desirable futures and the principles and guiding practices that					
	Coordinating continuous improvement of workforce	Are there mechanisms for assessing the outcomes of learning and development activities to ensure that they align with business objectives					
		Is there a group/department assigned with the responsibility for coordinating continuous improvement of workforce competencies					
	Establish conflict and dispute resolution systems	Are there defined processes that enable individuals and workgroups to make decisions and resolve conflicts and disputes					
		Is there an organisation wide system for resolving conflicts and disputes?					

SHAPING THE WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Performanc e manageme	Performance planning	Are there processes for determining the organisation's current level of capability in each of its workforce competencies					
		Are there processes for using the capability results to plan the actions to be taken to ensure the required workforce competencies are available when needed					
	Performance evaluation and reviews	Are there mechanisms for recording the results of performance for use as input to decisions about adjustment to compensation, personal development planning, staffing,					
		Are there mechanisms in place that define and collect data regarding competency development trends to determine the impact of workforce practices on performance and to					
	Process performance baselines and quantitative performance models	Is there a system that provides for the setting of performance baselines for competency-based processes to enable assessment of individual or workgroup achievement					
		Does the system allow for continual adjustment of performance baselines in line with the results of workforce improvement activities					
	Manage the performance of competency-based processes	Are assessments of performance made based on individual or workgroup achievement of baselines for competency-based processes					
		Are there systems in place to manage and resolve performance problems					
	Manage outstanding performance	Are there systems in place that demonstrate the sustained pursuit of excellence through innovative responses to business needs and the maintenance of the highest levels of					
		Are there robust strategies in place for quality assurance and performance management that raises standards, encourages, challenges and supports employees to					

SHAPING THE WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Alignment (Organisation level)	Continually align workforce architecture to business objectives	Is the impact of workforce learning and development practice evaluated to ensure that they encourage alignment rather than discourage alignment with business objectives					
		Are there mechanisms in place to periodically adjust the strategic workforce plan to align with business needs					
	Align performance at all levels and across projects to business objectives	Are there mechanisms in place to collect process performance data across projects and business units in order to evaluate for alignment with business objectives					
		Are there mechanisms to ensure that process performance at all levels align with business objectives					
	Standardise workforce practices across business units and projects	Are the workforce practices for staffing, compensation and performance management standardised across projects and business units					
		Is the development of competency-based process capability standardised across projects and business units					
	Adjust workforce practices to business needs	Does the compensation strategy motivate and reward the development of knowledge, skills, process abilities and behaviour that the organisation considers vital to its success					
		Is compensation periodically adjusted to ensure they are equitable and consistent with the organisations business strategy					
	Develop synergy across business units and projects	Are there processes for collecting performance data across projects and evaluating for alignment					
		Are the use of innovative competency based processes which have been successfully tried and tested encouraged across projects and business units					

BUILDING A LEARNING ENVIRONMENT

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Learning Culture	Develop a culture of continuous improvement	Is continuous learning and development considered a legitimate part of day-to-day business?					
		Are there mechanisms in place to ensure that all employees embrace a culture of continuous improvement, everyone strives to improve on their own capacity and contribute to					
	Workplace learning options (practice, sharing, promoting good practice, modelling)	Is there a system in place that employs the full range of workplace learning options to enable learning and development through practice, sharing, promoting best					
		Does the system allow for learning from incidents and mistakes?					
	No blame for genuine mistakes	Is there a culture for not laying blame for genuine mistakes but rather for solving problems when they arise and learning from them					
		Are there mechanisms in place to ensure a proactive response to underperformance by responding quickly to assist and support employees to improve					
	Information sharing	Is there a culture of trust in the organisation built on communicating openly and honestly with employees, listening to and valuing their contributions					
		Are there mechanisms that encourage and facilitate the sharing of knowledge horizontally and vertically across levels and functions					
	Knowledge capture and storage	Is there an effective knowledge management system in place to capture, code and continually update relevant knowledge, best practices and lessons learned from sources					
		Does the knowledge sharing and management system leverage on ICT based platforms for capture, organisation, storage, accessibility, diffusion and utilisation of knowledge					

BUILDING A LEARNING ENVIRONMENT

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Learning resources	Capture and store, process knowledge, information and artefacts from practice	Are individuals and workgroups encouraged to capture and store process knowledge, information and artefacts obtained from practice of competency-based processes					
		Are there mechanisms in place to incorporate such knowledge into the organisation's knowledge sharing and management system					
	Develop and maintain facilitators, mentors and coaches	Is there a system for developing and sustaining mentoring and coaching programmes in the organisation and at project level					
		Is there a system for identifying and developing mentors and coaches to facilitate workplace learning and development of workforce competencies					
	Web-enabled learning	Is there a system in place to develop learning content in a variety of electronic formats that can be delivered over the internet or organisation's intranet using a combination of static and interactive methods					
		Do all employees have access to browser equipment to allow for group and self-directed learning					
	Monitor learning resource needs	Are learning and development strategies sufficiently and appropriately funded for short and long term future needs?					
		Are learning and development options cost-effective, relevant and action oriented					
	Develop competency-based assets	Are selected bundles of information and artefacts organised into competency-based assets that can be re-used in performing work on projects and business activities					
		Is there a mechanism for continually updating information and artefacts to keep them current and relevant to the organisation's technologies and business activities?					

BUILDING A LEARNING ENVIRONMENT

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Integration	Integrate workforce practices across units and projects	Are there mechanisms in place to ensure that all employees including those at middle and lower levels as well as those on independent projects are not isolated from workforce development initiatives but are treated as part of the organisation structure					
		Are there mechanisms in place to ensure that performance across the entire organisation is strategically aligned to achieve business objectives					
	Integrate learning with HR practices and other business processes	Is there appropriate promotion, recognition and resourcing of learning and development by senior management					
		Is there a senior manager assigned with overall responsibility for learning and development in the organisation					
	Develop a picture of overall performance of the learning and development system in the organisation	Do you know for certain that your learning and development function is delivering value for money					
		Are there organisation wide systems in place to report on learning and development activities and their effectiveness					
	Develop synergy across, projects, levels and functions	Are stakeholder relationships with workers, supervisors, sub-contractors, project managers, managers, service providers, management effective					
		Is there a culture for sharing information and concerns across organisational levels (vertical and horizontal) and among independent projects?					

BUILDING A LEARNING ENVIRONMENT

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Employee involvement	Participatory decision making	Is there a participatory culture in decision making that enables the organisation to benefit from the capability of its workforce					
		Are all employees involved in decisions about the business activities of the organisation					
	Business and performance information requirements	Are there mechanisms in place to ensure that individuals and workgroups are given the information they need to make competent decisions					
		Are individuals and workgroups given feedback on the impact of their contributions to the decision making process					
	Participatory culture	Is there a system for building a participatory culture that enables the organisation to benefit from the capability of its workforce					
		Are there mechanisms in place to develop employee participation in the organisation and sense of ownership of the success of the business					
	Maximise level of competency applied to decision making	Are there mechanisms in place to allow for work decisions to be taken by employees with the most capability in that work competency					
		Are there mechanisms that allow for decisions to be taken by those closest to the work allowing them to gradually increase their responsibility and authority for the outcomes of those decisions					
	Adjust decision making process to shorten time required	Is employee learning and development encouraged through involvement in decision making in process improvement					
		Are there mechanisms in place to shorten the time required to make decisions on the job					

BUILDING A LEARNING ENVIRONMENT

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Learning spaces	Manage work environment to support learning	Are project/site managers creating a positive work environment, modelling learning for themselves and supporting learning and development on project sites					
		Are there support and assistance systems available to advice and support managers and individuals in identified capability areas					
	Learning resources close to work	Is there a system in place that allow for the provision of learning resources close to the project workplace					
		Are there mechanisms in place to allow employees access to learning resources					
	Virtual learning spaces	Are there provisions for appropriate virtual learning spaces for information sharing, discussion and knowledge generation					
		Are the virtual learning spaces accessible to all employees at all levels					
	Physical learning spaces	Are there provisions for appropriate physical learning spaces for information sharing, discussion and knowledge generation					
		Are the physical learning spaces accessible to all employees at all level					
	Balance expenditure on learning resources and learning environment	Are learning and development investments appropriate in terms of time, cost, quality and integration with other strategies and practices					
		Do learning and development investments address business, capability and individual needs					

MANAGING THE PROJECT WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Project workforce management	Workforce competencies and critical skills	Are project requirements in workforce competencies identified and articulated in project workforce plans					
		Are critical skills identified and highlighted in project workforce plans					
	Capability profile in workforce competencies	Are there mechanisms in place to determine the profile of the workforce capability in each of the project workforce competencies					
		Are there strategies for re-orienting workforce activities to include concerns that are strategic to shaping the project workforce					
	Project workforce planning	Are there strategies in place to ensure that the required workforce is available when needed on the project					
		Are there mechanisms in place to evaluate workforce learning and development needs for the project					
	Quantitative management of project workforce	Are there mechanisms in place to estimate and plan committed work using baselines established from past performance of the relevant competency-based processes					
		Are there mechanisms in place to continuously monitor performance against established baselines to highlight outstanding or under performance of relevant competency-based processes					
	Strategic project workforce development	Is there a plan in place for improving capability levels of the workforce in relevant competency-based processes during the course of a project					
		Are there mechanisms in place to define and collect data regarding competency development trends and compare to objectives in the strategic workforce plan					

MANAGING THE PROJECT WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Developing workgroups and teams	Develop competency based communities	Are there strategies in place for encouraging and supporting the development of communities of practice within the organisation					
		Are there mechanisms in place for supporting, at project level, the sharing of knowledge and development of collective intelligence implicit in communities of practice					
	Organise existing competence and experience in workgroups to develop additional capacity	Are there mechanisms in place to support learning and development through the composition of workgroups					
		Are members of workgroups trained in the relevant skills that enable groups of people to learn together and develop collective intelligence and ability					
	Integrate improvements into workgroup operating processes	Are there mechanisms to form cross-functional workgroups to work together to solve specific problems on the project					
		Are there mechanisms for analysing work to identify opportunities to integrate the innovative processes used by different workgroups					
	Delegating responsibility and authority to workgroups	Are there strategies for delegating to workgroups the responsibility and authority to make operational decisions					
		Are members of workgroups trained in the skills and processes required for working in empowered environments					
	Managing new knowledge and ideas emanating from workgroups	Are there mechanisms in place to capture and store for re-use new knowledge, ideas, techniques, that emanate from workgroups and teams					
		Are there mechanisms in place for diffusing new knowledge and ideas emanating from workgroups					

MANAGING THE PROJECT WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Managing workforce learning and innovation	Structured Approach	Does the organisation have a structured and accountable approach to the management of learning and development at project level?					
		Are line managers held responsible and accountable for the continuous improvement of their subordinates					
	Learning and development to focus on the knowledge, skills and process abilities for workforce competencies	Are learning and development options based on organisational and business unit priorities					
		Are learning and development options balanced with individual priorities and needs					
	Motivate and enable the development of workforce competencies	Are there strategies for motivating the workforce to learn and develop themselves in the project workforce competencies					
		Are there mechanisms in place to continuously improve capability in the workforce competencies					
	Provide learning options on project sites	Are learning and development options cost-effective, relevant and action-oriented to facilitate transfer of learning to the workplace					
		Are learning and development options varied, timely, flexible, collaborative, compatible with individual learning styles and adult learning principles					
	Organise mentoring and coaching activities	Are mentoring and coaching on the job a part of learning and development on project sites					
		Are the resources for mentoring and coaching activities provided in project resource planning					
	Deploy innovations and competency-based assets	Are there incentives in place to ensure that project/site managers encourage and provide opportunities to develop and test new knowledge, skills and ideas					
		Are there mechanisms in place to integrate improvements at individual and workgroup level into the projects operating processes?					

MANAGING THE PROJECT WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Performance management	Establishing a performance driven environment	Are there strategies for building a performance driven culture demonstrated by a sustained desire to maintain the highest level of performance by all workers and an uncompromising ambition to constantly improve performance					
		Are there strategies in place to develop a work environment where employees feel valued and 'engaged' in work in an atmosphere of mutual trust and confidence					
	Conduct two-way performance conversations	Are there regular conversations between employees and line managers to discuss performance and to identify ways of improving					
		Are there mechanisms to ensure that these conversations are an effective way for employees to voice their views and concerns					
	Continually discuss ways of improving performance	Are there mechanisms in place that motivate employees to reflect on their practice, to share ideas and to improve					
		Is there adequate flexibility so that the creativity and strengths of individuals are nurtured					
	Manage and resolve performance problems	Are there strategies for setting aspirational targets for the project and holding staff accountable for achieving those goals					
		Is the focus on creating a culture that encourages continuous improvement and the pursuit of excellence rather than solely about manging underperformance					
	Analyse and evaluate impact of workforce practices on project workforce	Are there mechanisms in place to assess how learning has improved individual and organisations knowledge, skills and competencies					
		Are there mechanisms in place to review effectiveness and performance at the end of each project to capture learning, improvement and innovation for use in future projects					

MANAGING THE PROJECT WORKFORCE

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Alignment (project level)	Continually align project workforce competencies to business objectives	Are there strategies for determining the workforce competencies required currently and in the future to meet project objectives					
		Are there mechanisms in place to continually adjust project workforce competencies to align with the needs of the business					
	Align individual and workgroup performance to business objectives	Are there mechanisms setting aspirational goals for individuals and workgroups in line with project objectives					
		Are there mechanisms for evaluating individual and workgroup performance against set project goals					
	Standardise workforce practices	Are workforce practices for staffing, compensation and performance management standardised across project workforce					
		Are workforce practices for staffing, compensation and performance management on the project in line with organisation standards					
	Adjust workforce practices to business needs	Are there strategies for continually adjusting workforce practices in line with changing business needs					
		Is compensation periodically adjusted to ensure they are equitable and consistent					
	Align project performance to organisational objectives	Are there mechanisms for evaluating project performance against aspirational project goals					
		Are there mechanisms for recording the results of reviews to be used as lessons learned, suggestions from the workforce and best practice on future projects					

INDIVIDUAL WORKER DEVELOPMENT

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Individual worker career development	Define graduated career opportunities around workforce competence	Are employees made to know and understand the organisation's capability requirements?					
		Are employees made aware of career opportunities available in increasing their levels of capability in the organisation's strategic workforce competencies					
	Motivate and guide development through graduated career opportunities	Are individuals made aware of their roles and responsibilities regarding individual development and career management					
		Are there mechanisms in place that continually inform individuals of the knowledge, skills, competencies and the standards of performance they require to fulfil their role in the organisation					
	Periodically counsel about career options	Are line managers aware of their role and responsibilities regarding individual development and career management					
		Are there mechanisms in place to ensure that individuals receive counselling on career options within the organisation					
	Periodically communicate opportunities for advancement	Are there mechanisms in place to communicate opportunities for advancement in the organisation to workers on a regular basis					
		Are the individuals made aware of the knowledge, skills and process abilities required in advanced positions in the organisation					
	Define graduated career opportunities and promotion criteria to motivate growth in organisation's workforce competencies	Are there strategies to define career opportunities and promotion criteria in line with the organisation's workforce competency requirements					
		Are these mechanisms to evaluate the success of these strategies in motivating individuals to develop the competencies required for achieving business goals					

INDIVIDUAL WORKER DEVELOPMENT

Component	Sub-component	Assessment Checklist	Understood in principle but not yet in place	Designated persons are responsible for managing this aspect	This aspect is defined and standardised	This aspect is regularly measured and evaluated	This aspect is continuously improved on based on quantitative assessments
Individual learning	Encourage individuals to make continuous improvements to their personal work processes	Are there mechanisms to ensure that individuals reflect upon and improve their mental pictures of their work and allowing these to shape their actions and decisions					
		Are individuals supported to continually analyse their work and to make necessary process enhancements					
	Develop plans to ensure that all individuals have the operational skills required by their assignments	Are there mechanisms in place to create and update a personal development plan for each individual designed to stretch and challenge the individual					
		Are individuals supported to achieve their roles through work narration, modelling, mentoring, coaching and regular feedback					
	Focus other development activities on other objectives once current assignments are mastered	Are there mechanisms in place to graduate capability development of individuals in a structured manner moving from lower levels of complexity to higher					
		Are there mechanisms in place to rotate individuals from work competency which they have mastered to another in order to facilitate the development of multiple skills					
	Make individuals accountable and responsible for making the necessary changes within their work areas	Are there mechanisms to ensure that each individual take responsibility and are accountable for making the necessary changes within their individual work areas, it is no longer the sole responsibility of line managers to make changes					
		Are individuals provided with learning and development opportunities to work in empowered work environments					
	Measure capability and focus learning and development on work competencies and attitudes	Are there mechanisms in place to periodically evaluate individual capabilities in knowledge, skills, process abilities, and attitudes					
		Are there mechanisms to focus learning and development efforts on determined individual learning and performance deficits					

INDIVIDUAL WORKER DEVELOPMENT

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Whole person development	Develop social and communication skills	Are there mechanisms in place to ensure that individuals develop the effective communication skills required for learning and performance (listening, questioning, reflecting, assertiveness)					
		Are there mechanisms in place to ensure that individuals develop the social functioning skills required for social learning and performance (connection to people, consideration for others, positive engagement with people, appropriate responses to social cues, self-control)					
	Develop personal motivation	Are there mechanisms in place to ensure that individuals develop the intrinsic motivations that drive learning and performance (motivations to know, accomplish and to experience stimulation)					
		Are there mechanisms to keep individuals motivated in the workplace					
	Develop creativity and pride in work	Are there mechanisms in place to ensure that individuals develop the creative skills required for innovative performance (divergent and lateral thinking, imagination, creative problem solving)					
		Are there mechanisms in place to ensure that individuals develop the sense of craftsmanship required to for excellence in performance (pride in work, desire to perform excellently)					
	Develop a business-like attitude	Are there mechanisms in place ensure that individuals develop the business sense required for optimal performance (understanding of business purpose, shared vison, persistence, improvement orientation, responsibility and conscientiousness)					
		Are there mechanisms in place to develop and sustain a sense of 'ownership' in the success of the business in individuals					
	Develop personal working life skills	Do individuals have opportunities to develop life skills (time management, safety, work/health balance, goal setting and career development) to improve their sense of well-being and balance at work					
		Are there support systems available to advice line managers in the mechanisms appropriate for whole person development of individuals					

INDIVIDUAL WORKER DEVELOPMENT

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Performance Management	Setting performance objectives	Are graduated performance objectives and competencies agreed between line managers and individuals for each review period covering essential outputs, special projects and behaviours					
		Are the set performance objectives and competencies supported by appropriate learning and development options					
	Performance reviews	Are there mechanisms in place to review individual performance against set objectives and behaviours throughout the period					
		Are there mechanisms to obtain 360 performance assessments on individuals in order to eliminate bias and provide robust feedback on which future development plans can be based					
	Monitor, record and evaluate improvement	Are there mechanisms in place to monitor, record and evaluate improvements in individual performance					
		Are there mechanisms in place to evaluate the impact of learning and development initiatives on performance					
	Discuss performance of work continually to identify ways of improvement	Do line mangers support and coach individuals to enable them to understand possible options for continually improving performance and to take necessary action					
		Do individuals receive regular feedback on how they are doing in terms of objectives and competencies, achievements, areas for further reflection, areas that require improvement, and areas of concerns about performance					
	Manage and resolve performance problems	Are there mechanisms in place to identify areas where performance fails to reach required standards in order to agree practical solutions as early as possible and minimise the effect					
		Are line managers trained in appropriate options for dealing with individuals who consistently underperform					

INDIVIDUAL WORKER DEVELOPMENT

Component	Sub-component	Assessment Checklist	Understood in principle but no process in place	Designated persons responsible for managing processes	Processes are defined and standardised	*Processes are regularly measured and evaluated*	Processes are continuously improved based on quantitative assessments
Alignment (Individual level)	Provide financial rewards in line with organisation's goals	Are there financial rewards for improved performance in workforce competencies					
		Are there one off bonuses for outstanding performance in achieving organisational objectives					
	Provide career incentives in line with organisation's goals	Are there promotion rewards for improved performance in workforce competencies					
		Are there offers for increased development opportunities in workforce competencies					
	Provide special recognition awards for contributions in line with organisations strategic plans	Are there special recognition rewards for contributions to advancing the organisations strategic position in the market					
		Are there special recognition awards for long term contributions in achieving the organisation's objectives					
	Provide ownership options as incentive for improved efforts at achieving business objectives	Are there offers of share options for outstanding performance in achieving organisational goals					
		Are there opportunities for rising to senior management positions as incentive for innovative contributions to the growth of the business					
	Define and communicate clear aspirational targets for individual performance in achieving the long and short term objectives of the organisation	Are there strategies to set and communicate aspirational targets in line with organisation's short and long term objectives against which outstanding performance can be measured and evaluated					
		Are there mechanisms for adjusting and updating aspirational targets in line with changes in organisational objectives					

TOTALS & REPORTS

Dimensions	Components	Sub-subtotal Component Scores	Subtotal Dimension Scores	Total Aggregated Score
Shaping the Workforce				
	Strategic workforce planning			
	Workforce practices			
	Communication and coordination			
	Performance management			
	Alignment (organisation level)			
Building a Learning Environment				
	Learning culture			
	Learning resources			
	Integration			
	Employee involvement			
	Learning spaces			
Managing Project Workforce Learning and Development				
	Project workforce capability management			
	Developing workgroups and teams			
	Managing workforce learning and development			
	Performance management			
	Alignment (project level)			
Individual Worker Development				
	Career development			
	Individual learning management			
	Whole person development			
	Performance management			
	Alignment (individual level)			

TOTALS & REPORTS

REPORT

Learning & Development Maturity Level

	Organisation	
	Dimensions	
	Shaping the Workforce	
	Building a Learning Environment	
	Managing Project Workforce Learning and Development	
	Individual Worker Development	
	Components	
	Strategic workforce planning	
	Workforce practices	
	Communication and coordination	
	Performance management	
	Alignment (organisation level)	
	Learning culture	
	Learning resources	
	Integration	
	Employee involvement	
	Learning spaces	
	Project workforce capability management	
	Developing workgroups and teams	
	Managing workforce learning and development	
	Performance management	
	Alignment (project level)	
	Career development	
	Individual learning management	
	Whole person development	
	Performance management	
	Alignment (individual level)	

TOTALS & REPORTS

ANNEX 4.7 CLEARDO ASSESSMENT WORKED EXAMPLE

Dimensions	Components	Sub-subtotal Component Scores	Subtotal Dimension Scores	Total Aggregated Score
Shaping the Workforce			10	42
	Strategic workforce planning	2		
	Workforce practices	3		
	Communication and coordination	1		
	Performance management	2		
	Alignment (organisation level)	2		
Building a Learning Environment			10	
	Learning culture	2		
	Learning resources	2		
	Integration	2		
	Employee involvement	2		
	Learning spaces	2		
Managing Project Workforce Learning and Development			11	
	Project workforce capability management	2		
	Developing workgroups and teams	3		
	Managing workforce learning and development	2		
	Performance management	2		
	Alignment (project level)	2		
Individual Worker Development			10	
	Career development	2		
	Individual learning management	2		
	Whole person development	2		
	Performance management	2		
	Alignment (individual level)	2		

TOTALS & REPORTS

REPORT

Learning & Development Maturity Level

	Organisation	
	Dimensions	
	Shaping the Workforce	1
	Building a Learning Environment	2
	Managing Project Workforce Learning and Development	2
	Individual Worker Development	2
	Components	
	Strategic workforce planning	2
	Workforce practices	3
	Communication and coordination	1
	Performance management	2
	Alignment (organisation level)	2
	Learning culture	2
	Learning resources	2
	Integration	2
	Employee involvement	2
	Learning spaces	2
	Project workforce capability management	2
	Developing workgroups and teams	3
	Managing workforce learning and development	2
	Performance management	2
	Alignment (project level)	2
	Career development	2
	Individual learning management	2
	Whole person development	2
	Performance management	2
	Alignment (individual level)	2

Overall Maturity Level is 1

Overall Rating is brought to the lowest score. The organisation needs to work on Shaping the workforce dimension and specifically communication and coordination in order to move up to Level 2.